# Sonoran Desert National Monument:

# Juan Bautista de Anza Recreation Management Zone

# Recreation Plan

Environmental Assessment No. DOI-BLM-AZ-P040-2015-0002-EA

*View of North Maricopa Mountains from Anza National Historic Trail, Sonoran Desert National Monument, Arizona.*

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Sonoran Desert National Monument
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# 1. Introduction

## 1.1. Background

The roughly half million acre Sonoran Desert National Monument (SDNM), located in south-central Arizona (Figure 1), was established by Presidential Proclamation 7397 on January 17, 2001. Since its establishment, certain parts of the SDNM experienced increased visitation from growing adjacent communities, which in turn increased the public awareness and popularity of these areas for off-highway-vehicle (OHV) use. Motorized vehicle use off road led to visible damage to the soils and vegetation of lands adjacent to primary access routes; to degradation of the natural and cultural resource objects for which the monument was designated, including a portion of the Juan Bautista de Anza National Historic Trail (Anza NHT); and to degradation of the scenic values of the monument. The results of a scientific study on recreation impacts in the SDNM conducted by researchers from Northern Arizona University (Foti, 2007) indicated that such impacts as litter, trash dumping, social trails, damage to vegetation (including all separate categories for trees, shrubs, saguaros, and other cacti), and damage to rock formations increased significantly at vehicle-based "recreation nodes," or campsites, during the period between 2005-2007.

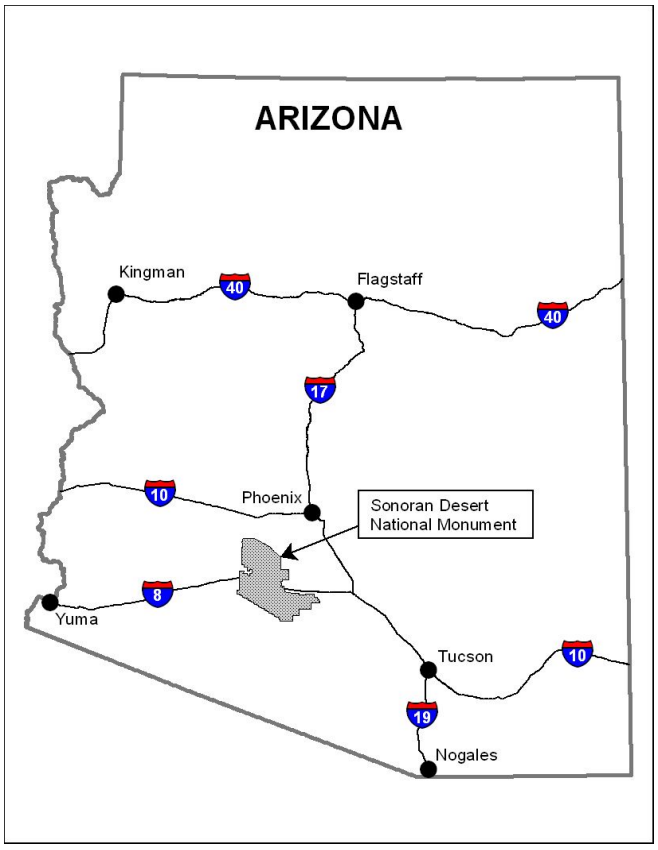


**Figure 1:** Location of the Sonoran Desert National Monument

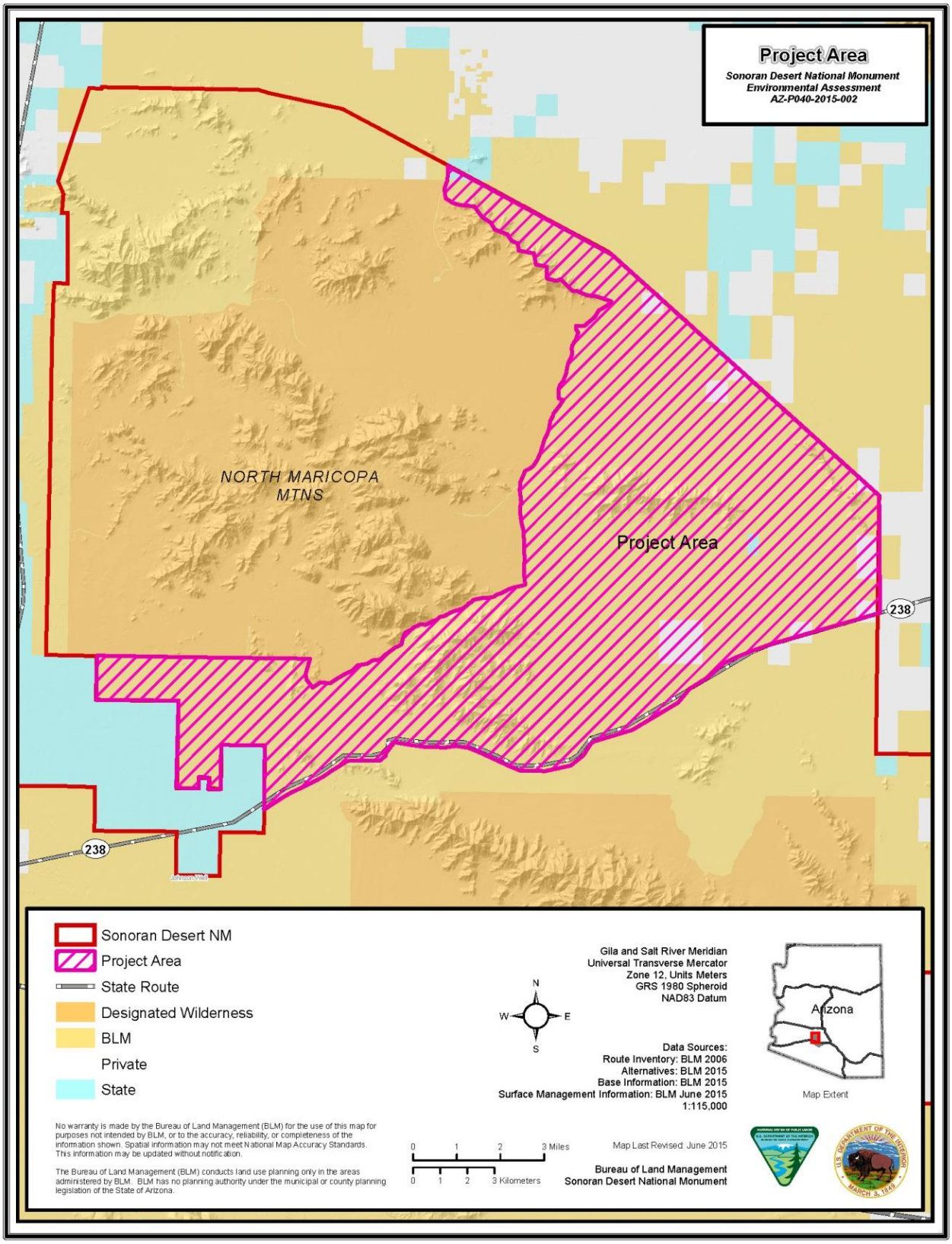


**Figure 2:** Map of area of proposed project.

In June, 2008, BLM temporarily closed approximately 90 miles of vehicle routes within the 53,469 acre project area to motorized use (Figure 2) (BLM, 2007; BLM, 2008). The BLM reclaimed OHV damage in the closure area by hand raking, "vertical mulching," harrowing, seeding (native plants only), and posting of informational signs.

In 2012 the SDNM Record of Decision and Approved Resource Management Plan was signed. The plan formally dedicated routes within the monument as open, limited, or closed. No areas were designated open (no cross country travel).

## 1.2. Purpose and Need

Presidential Proclamation 7397 required that "[f]or the purpose of protecting the objects identified above, all motorized and mechanized vehicle use off road will be prohibited, except for emergency or authorized administrative purposes" (generally, monument "objects" were described to be "a spectacular diversity of plant and animal species" and "significant archaeological and historic sites"). Additionally, OHV management regulations at 43 Code of Federal Regulations (CFR) 8341.1(a), direct that "…the authorized officer shall immediately close the areas affected to the type(s) of vehicle causing the adverse effect until the adverse effects are eliminated and measures implemented to prevent recurrence."

Thus, the purpose of this project is to protect the natural and cultural features and objects for which the SDNM was designated by assuring that continued recreational use of the Juan Bautista de Anza National Historic Trail Recreation Management Zone (Anza RMZ) is consistent with law and regulation.

The need is to implement the SDNM Resource Management Plan (RMP), which was signed in 2012, along with the associated travel and transportation plan. The RMP designated as open for public use certain routes closed during 2008 as part of the temporary route closure described above.

## 1.3. Conformance with Land Use Plan, and Relationship to Statutes, Regulations, or Other Plans

The proposed action is in conformance with SDNM RMP, which states:

RM-1: Establish Extensive Recreation Management Areas (ERMAs) and associated zones where specific management considerations are necessary to address recreation use, demand, or recreation program investments commensurate with management of other resources and resource uses while sustaining the principle recreation activities and associated qualities and conditions of the area.

RM-1.2: Provide modest facilities, educational opportunities, and visitor information to the extent that 90% of sampled visitors report satisfaction with their recreation experience. The Sonoran Desert National Monument ERMA will be designated (486,400 acres) to provide for recreational opportunities and outcomes that derive from the objects for which the National Monument was designated.

RM-1.2.1 (Juan Bautista de Anza NHT Recreation Management Zone {RMZ}): To provide recreation and educational opportunities directed at visitors seeking to discover, tour, and learn

about the Juan Bautista de Anza National Historical Trail (NHT), Arizona history, and natural history of the Sonoran Desert.

RM-1.2.1.5: The motor vehicle travel system will consist primarily of primitive roads maintained at levels 1-3 with up to 20% maintained at level 5 to provide two-wheel drive passenger car access to public use cultural sites, day use areas and camping facilities.

The proposed action is in conformance with the Management Plan and Environmental Assessment (EA), 2012, which states: SDNM Travel and Transportation

This Travel Management Plan (TMP) supplements travel management land use allocations and planning decisions made in the Sonoran Desert National Monument (SDNM) Record of Decision and Approved Resource Management Plan (RMP). Decisions and implementation actions not made in the RMP will be addressed in this TMP. This document will set forth a plan to manage SDNM's designated system of roads, primitive roads and trails, access and uses while ensuring Monument objects, for which the Monument was created, are protected.

Relationship to Statutes, Regulations, or Other Plans

As described above, the proposed action is consistent with Presidential Proclamation 7397, and with OHV management regulations at 43 CFR 8341.1(a), the SDNM RMP, and the SDNM Transportation and TMP

The proposed action is consistent with the Juan Bautista de Anza National Historic Trail Comprehensive Management and Use Plan (1996). This management plan considered inter-agency cooperative management, interpretative topics and themes, and public access to federally and non-federally owned high value segments of the 1,200-mile Anza NHT. No specific management actions or interpretive themes were identified for that portion of the Anza NHT traversing the project area, although the plan states that generally:

- "The National Park Service (NPS) will encourage development of user facilities such as trail access parking, picnic sites, camp sites, horse corrals, water, bicycle racks and storage and also encourage public transit to recreational trail staging areas and historic sites." (p. 34)

- "…NPS will encourage mitigations as needed to prevent any adverse impacts on cultural or natural resources, or the quality of visitor experience." (p. 36)

# 2. Description of Alternatives

## 2.1. No Action

Under the No Action alternative, facilities for parking, camping, sightseeing, and area interpretation would not be developed and the temporary closure to motorized vehicles implemented in June, 2008 (Figure 3) would remain in effect. Group use would remain limited to ten permits issued annually, with this permitted use including access to group sites by motor vehicles. The restoration of soils, vegetation, and scenic values that have been degraded through improper OHV use would continue. The resources for which the SDNM was designated would be protected as OHV use of the area would remain prohibited.

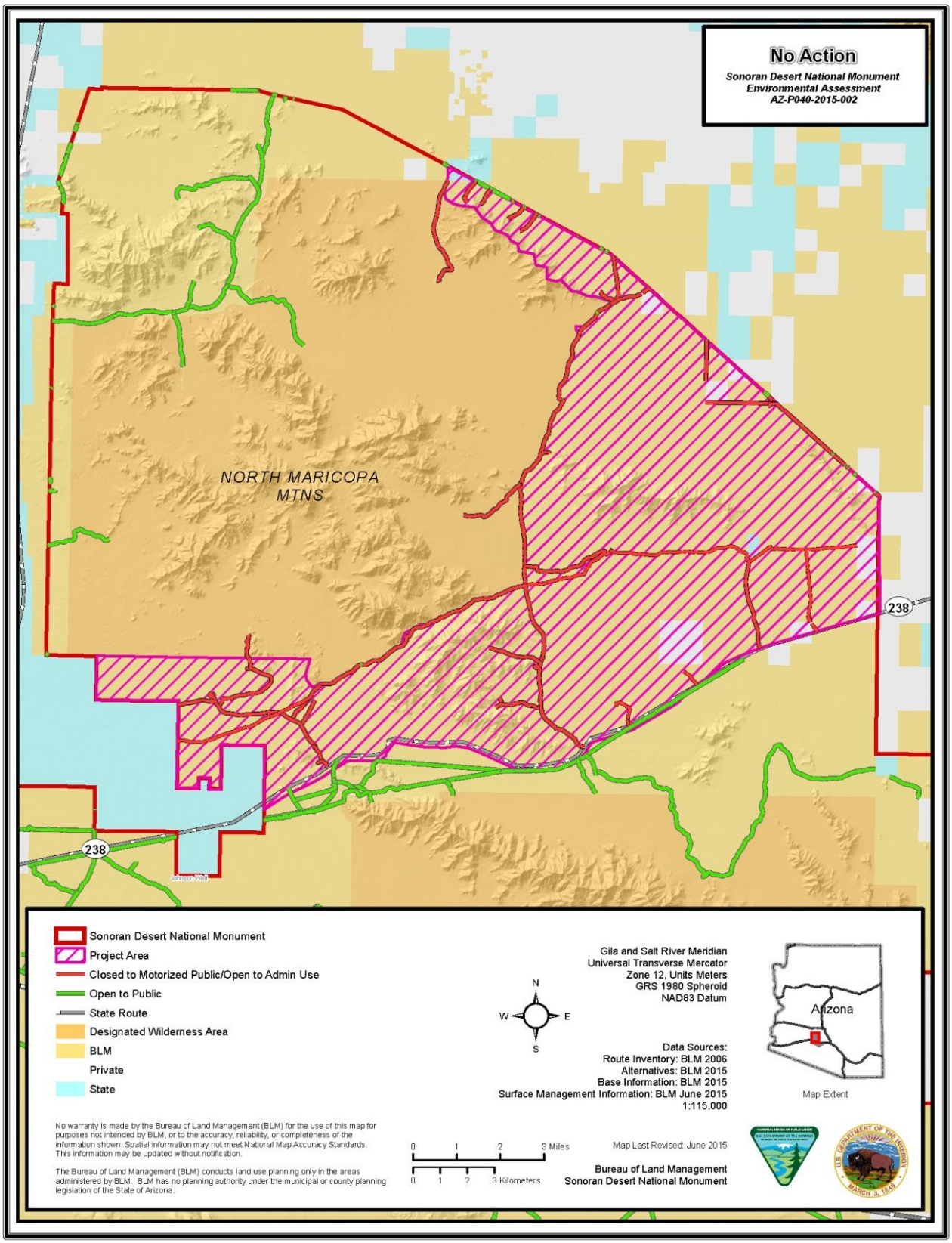


**Figure 3:** Map of the No Action alternative.

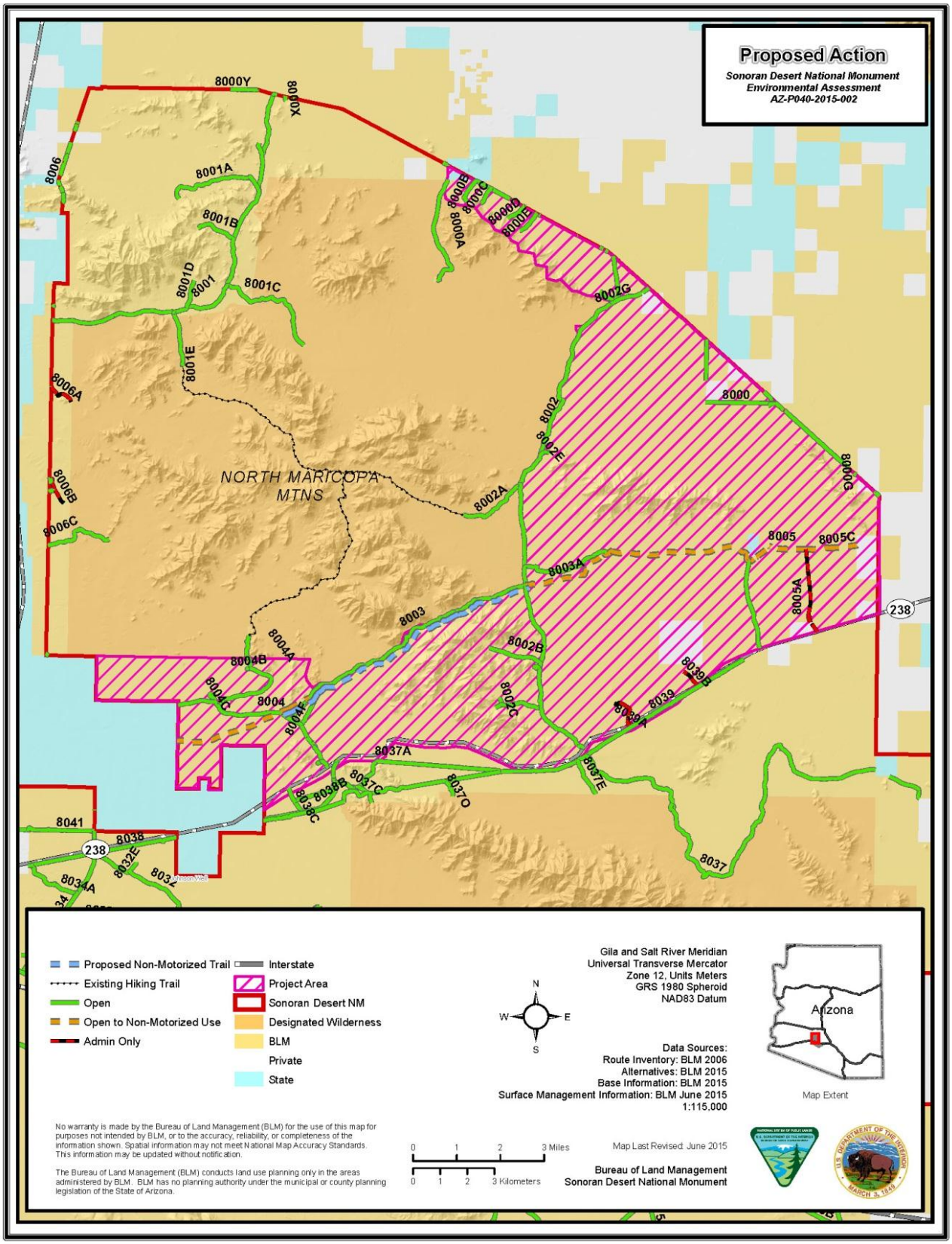


**Figure 4:** Map of the Proposed action alternative.

## 2.2. Proposed Action

The Proposed Action provides for the design and development of parking, camping, sightseeing, and interpretive facilities in an effort to balance the opportunities and impacts resulting from provision of both motorized and non-motorized recreation opportunities. The resources (Monument objects) for which the SDNM was designated would be protected as OHV use would be limited to specific locations designed and constructed to minimize impacts. Motorized traffic flow on a portion of the Anza NHT would be allowed but regulated, and non-motorized uses would be segregated from motorized uses. An overview of proposed route classifications is provided in Figure 4. Specific actions proposed include:

### 2.2.1. Butterfield Recreation Area

A "Butterfield Recreation Area" would be developed as the primary visitor destination of the SDNM (Figure 5).

A. BLM Route 8004 would be gravel-surfaced (approximately 30-foot width) north from Maricopa County Road 238 (Maricopa Road) for a distance of approximately 1.25 miles to facilitate safe, two-way traffic to Gap Well and adjacent attractions. Sandy wash crossings (approximately three) would be improved by installing temporary low-water crossings such as steel mesh or similar structures to allow safe passage of two-wheel-drive passenger cars and recreational vehicles.

B. A SDNM entrance sign and mounting support that may incorporate rock, steel, and/or concrete as design elements would be located at the turn from Maricopa Road.

C. A visitor contact station would be developed approximately 0.25 to 0.5-mile north of Maricopa Road adjacent to BLM Route 8004. This facility would include a gravel-surfaced loop road approximately 15 feet in width and 0.25-mile in length to facilitate one-way traffic flow, a gravel-surfaced parking area with a capacity of 10-15 passenger vehicles and five recreation vehicles, and a shade ramada with concrete foundation and interpretive and educational signs for the visiting public. A non-motorized, loop "nature trail" approximately 0.5-mile in length would be constructed. This trail would begin and end at the visitor contact station and would include small educational signs of local flora, fauna, and other interpretive interests.

D. An 18-24 site campground would be developed opposite "Gap Well" and adjacent to an existing two-vault toilet. Approximately 0.25-mile of BLM Route 8004F would be widened to a 30-foot width and gravel-surfaced for two-way traffic. At the end of this segment, an approximately 1.0-mile gravel-surfaced loop road designed for one-way traffic (approximately 15-foot width) would be constructed. Drainage wash crossings would be facilitated by installation of culverts or temporary low water crossings (approximately eight to ten). Each campsite would be equipped with gravel- surfaced parking area, picnic table, and steel fire-ring. Two vault toilets, of either single or double vault design, would be sited on the camping loop road for future construction, when needed.

E. The Gap Well and associated livestock management facilities (concrete-lined tank, wood corral, and barbed-wire fencing) located in T. 5 S., R. 3 W., section 11 would be acquired by BLM from a willing seller. Upon acquisition, a determination of the suitability of the well for recreation purposes would be completed and the well either retained for future

use or abandoned. The site, frequently used by large groups, would be "hardened" by adding a soils binding agent with gravel to use and developed as a group-use site with a maximum capacity of 200 individuals and 75 vehicles. A graveled driving and parking surface, steel or rock-lined fire ring, and picnic tables would be installed, and a low pipe-rail fence would encircle the site to prevent encroachment on the adjacent area.

F. A day-use visitor area, trailhead, and interpretive display would be developed north of Gap Well adjacent to the Anza NHT. Approximately 0.75-mile of BLM routes 8004 and 8003 would be widened to 30-feet and gravel-surfaced to accommodate two-way traffic. At the eastern end of this segment, a gravel- surfaced loop road designed for one-way traffic (approximately 15-foot width) would be constructed. This loop road would be approximately 0.4-mile in length. A display of interpretive and educational signs, shade ramada, and approximately six picnic tables would be installed adjacent to the loop road. A pipe-rail and/or wire fence vehicle barrier would be constructed, if necessary, to restrict vehicle traffic from accessing the Anza NHT at this point. Non-motorized visitors (primarily large hiking groups and "handcart re-enactors") to this area of the Anza NHT would travel down the existing BLM Route 8003 to access BLM Route 8004.

G. The existing Brittlebush Trailhead would be modified with the addition of a gravel-surfaced parking area with a capacity of ten vehicles. A low pipe-rail barrier would encircle the trailhead area. BLM routes 8004 and 8004A providing access to the trailhead would be maintained and stabilized with the use of chemical soil binding agents, water runoff drainage ditches, and culverts, if needed.

H. An equestrian facility, located in T. 5 S., R. 3 W., section 2 would be developed adjacent to BLM Route 8004D to complement the existing Brittlebush Trailhead. This facility would be of pipe-rail construction and would accommodate a maximum of 25 horses. A gravel-surfaced parking area for up to ten vehicles with horse trailers and two group camping sites with picnic tables and steel fire-rings would be included along with one vault toilet. Each group camping site would be designed for a maximum capacity of five vehicles with trailers. The equestrian facility would be located at least 0.25-mile from Arizona Game and Fish Department wildlife water catchment number 452.

I. A day-use picnic area would be constructed in T. 5 S., R. 3 W., sections 13 and 14. This development would be constructed when daily visitation to the day-use site detailed in Item F above regularly reaches its designed capacity. The future day-use picnic area would consist of a gravel-surfaced, one-way traffic loop road approximately 1.0-mile in length with up to 18 sites located at intervals adjacent to the loop road. Each site would have a picnic table and steel fire-ring. A non-motorized hiking and interpretive trail, approximately 2.5-3.0 miles in length, would be constructed around the base of the unnamed hill west of, and adjacent to, the day-use area. Interpretive and educational signs would be provided, and up to two vault toilets would be constructed at sites adjacent to the loop road.

J. The Anza NHT would remain permanently closed to motorized use, except by permit or administrative use, from the eastern boundary of the SDNM to the intersection of BLM route 8003A with 8002 (approximately 8.3 miles) near the Wayside Group Area. The Anza NHT would remain open for motorized use as a primitive road (maintenance level "5") west from the Wayside Group Area along BLM Route 8003 through Butterfield Pass

to BLM Route 8004 (approximately 7.3 miles); however, traffic standards would be developed (such as for speed and one-way traffic flow) to reduce impacts to the Anza NHT. Additional actions to limit impacts, such as a permitting system or permanent closure to motor vehicles, would be put into effect if use by motor vehicles degrades the Anza NHT beyond BLM's maintenance capabilities. The Anza NHT from BLM Route 8004 to the western boundary of the SDNM (approximately 2.5 miles) would be closed to use by motor vehicles. Impacts to Monument objects with implementation of the elements of this action would be considered negligible to minor. A trail for non-motorized use, approximately 6.4 miles in length and extending from BLM Route 8002 through Butterfield Pass to the Butterfield Recreation Area, would be constructed south of and generally parallel to the Anza NHT (BLM Route 8003, Figure 4. This trail would not extend into the North Maricopa Mountains Wilderness and would be available for use by hikers, equestrians, and bicyclists. The trail would be limited to a tread width of 24 inches, and would not be available for wider wheeled conveyances such as horse-drawn wagons and handcarts.

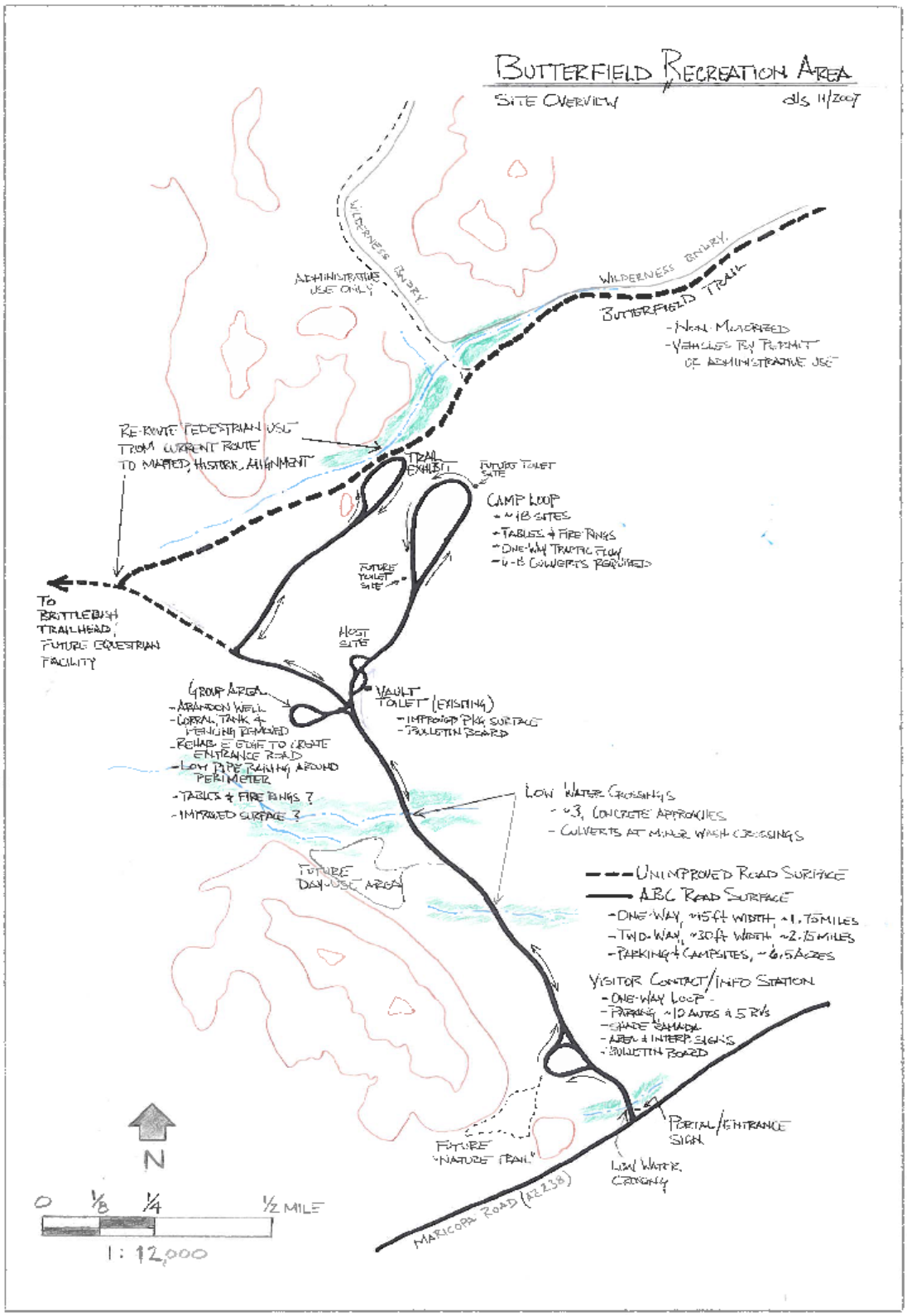


**Figure 5:** Butterfield Recreation Area.

### 2.2.2 Estrella Recreation Area

An "Estrella Recreation Area" (Figure 6) would be developed to provide motorized access to the mid-point of the Anza NHT, elements of this action would include:

A. BLM Route 8002 would be gravel-surfaced (approximately 30-foot width) north from Maricopa Road for a distance of approximately 0.25 to 0.5-mile to a visitor contact station (element "C").

B. A SDNM entrance sign and mounting support that may incorporate rock, steel, and/or concrete as design elements would be located at the turn from Maricopa Road.

C. A visitor contact station would be developed approximately 0.25 to 0.5-mile north of Maricopa Road adjacent to BLM Route 8002. This facility would include a gravel-surfaced loop road approximately 15 feet in width and 0.25-mile in length, a gravel-surfaced parking area with a capacity of approximately ten passenger vehicles and five recreation vehicles, and a shade ramada with concrete foundation and interpretive and educational signs for the visiting public.

D. The approximately 4.0-mile length of BLM Route 8002 extending from the visitor contact station to the Wayside Group Area (element "F") would continue to be managed as a primitive road suitable only for high-clearance, four-wheel-drive vehicles; however, locations of high berms and braided parallel routes caused by OHV damage would be restored and the route surface stabilized with a chemical soil binding agent.

E. Approximately ten primitive campsites would be dispersed adjacent to BLM routes 8002B and 8002C. A steel fire ring and a picnic table, but no other facilities, would be provided at each site.

F. The Wayside Group Area, located adjacent to the Anza NHT in T. 4 S., R. 2 W., NE ¼ section 27 and frequently used by groups as a camp stopover when hiking the Anza NHT, would be "hardened" for such use and developed to accommodate approximately 75 individuals and 20 vehicles. The parking surface would be gravel-surfaced, and a low pipe-rail would enclose and contain the area to prevent encroachment of the surrounding terrain. A bulletin board for educational materials would be installed. An archaeological clearance of the site will be completed prior to construction.

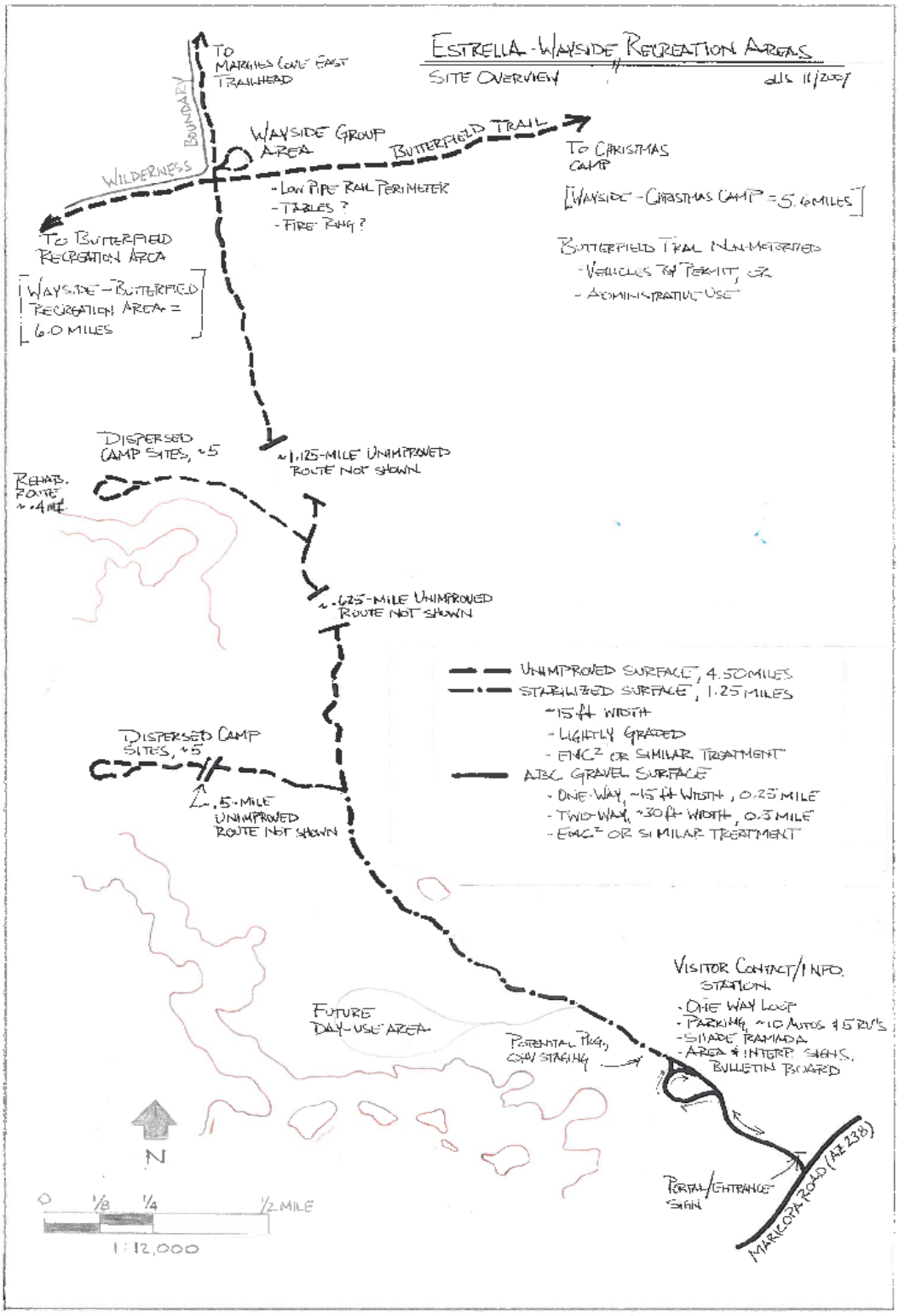


**Figure 6:** Estrella-Wayside Recreation Area.

### 2.2.3 Christmas Camp

The "Christmas Camp" group area would be developed adjacent to North Tank. Impacts to Monument objects with implementation of the elements of this action would include:

A. The intersection of BLM Route 8003 with Maricopa Road, BLM Route 8003 would be brought to the grade of Maricopa Road with a culvert and/or fill material, and a cattle guard would be installed in the right-of-way fence.

B. BLM Route 8003 would be stabilized with a chemical soil binding agent from Maricopa Road to the site of Christmas Camp (approximately 2.5 miles). Drainage ditches would be installed to move water runoff from the road surface. The route would not be increased in width.

C. A SDNM entrance sign and mounting support that may incorporate rock, steel, and/or concrete as design elements would be located at the turn from Maricopa Road.

D. An un-manned visitor contact station (kiosk) would be developed approximately 0.1 to 0.25-mile north of Maricopa Road adjacent to BLM Route 8003. This facility would include a loop turn-around road of approximately 15 feet in width and 0.1-mile in length, a parking area with a capacity of approximately five passenger vehicles and two recreation vehicles, and a shade ramada with concrete foundation and interpretive and educational signs for the visiting public.

E. BLM Route 8003 would be open to motor vehicles from Maricopa Road to the site of Christmas Camp; however, vehicle barriers and pipe-rail gates would be installed to restrict unauthorized motor vehicle access to route 8003 to the west of Christmas Camp and to route 8005 to the east of North Tank, assuring a non-motorized trail experience on these segments of the Anza NHT.

F. A temporary structure, such as steel mesh water crossing, would be installed where BLM Route 8003 crosses West Prong Waterman Wash.

G. The Christmas Camp site, located in T. 4 S., R. 1 W., NE ¼ section 21 and frequently used by large groups numbering up to 150 individuals, may be "hardened" for such use and developed as a group use site with a maximum capacity of 200 individuals and 75 vehicles. Pending an archaeological survey and clearance prior to construction, the parking area would be gravel-surfaced and a low pipe-rail would encircle the site to prevent encroachment of the adjacent area. A display of educational and interpretive signs would be installed adjacent to the site.

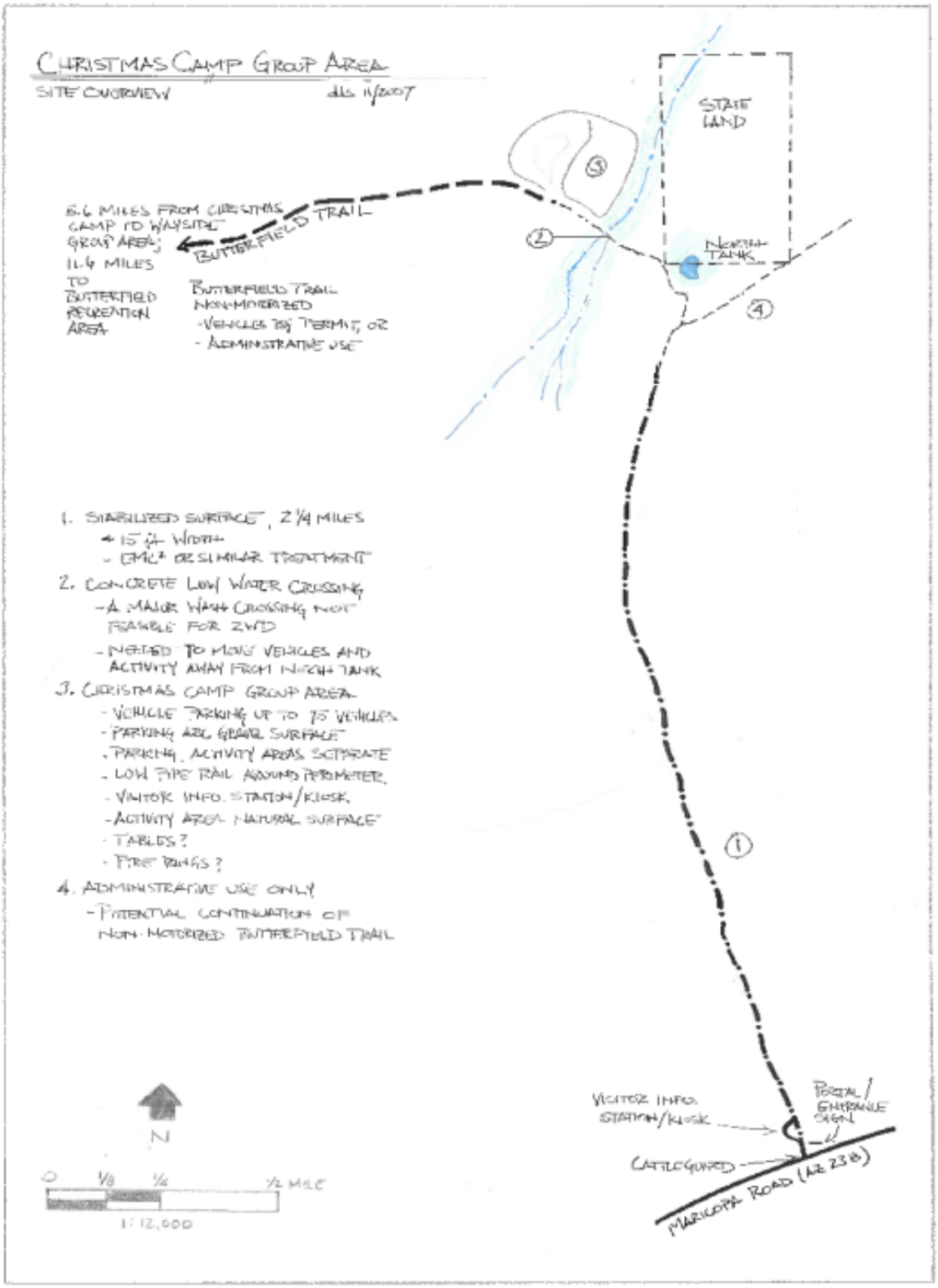


**Figure 7:** Site overview of the Christmas Camp Group Area

### 2.2.4 Additional Measures

A. A vehicle barrier may be constructed over the entire northern boundary of the SDNM generally contiguous with the southern edge of the El Paso Natural Gas pipeline right-of-way (approximately 21.2 miles), and would extend south along the eastern boundary of the SDNM to Maricopa Road (approximately 2.75 miles). The vehicle barrier may be of wire fence construction or of pipe-rail construction to the standard height of wire fencing (approximately 4.0 feet) and would be designed to accommodate wildlife movements. Cattle guards and gates would be installed at designated locations to prevent livestock from moving into unauthorized areas.

B. A reservation system for the scheduling and issuance of use permits for the designated group-use areas, individual campsites, and equestrian facility would be implemented if demand exceeds capacity as prescribed within the SDNM RMP and TTMP. This system is envisioned as web-based, and may be implemented in concert with a fee structure under provisions of the Federal Lands Recreation Enhancement Act (2004) with a business plan.

None of the proposed actions are expected to damage monument objects beyond the negligible to minor impact level. See Table 1 for qualitative terms for intensity of impacts.

**Table 1:** Qualitative Terms for the Intensity of Impacts for Monument Objects.

| **Negligible** | **Minor** | **Moderate** | **Major** |
|---|---|---|---|
| No known impacts on resources or resource uses. Any change is undetectable and immeasurable.<br><br>Objects are preserved throughout the Monument. | Direct effects are apparent, measurable, small, localized, and contained within the footprint of the action.<br><br>Indirect effects are undetectable.<br><br>Objects are preserved throughout the Monument. | Direct effects are readily apparent and measurable over a larger area, but are still mainly within the footprint of the action.<br><br>Indirect effects are apparent and measurable, but do not exceed much beyond the footprint of the action.<br><br>Objects may be affected on site and in the vicinity of the activity, but are maintained within the Monument. | Direct effects would be highly noticeable and substantial.<br><br>Indirect effects would be readily apparent and measurable well beyond the footprint of the action.<br><br>Objects, or some elements of the objects, would be permanently altered on site, as well as affected over a larger portion of the Monument. |

## 3. Affected Environment and Environmental Consequences

The following resources have been considered and are not present, or, based on current information, would not be affected by the Proposed Action or No Action alternatives:

- Areas of Critical Environmental Concern

- Floodplains
- Environmental Justice/Impacts to Minority and Low Income Communities
- Threatened or Endangered Species
- Mining
- Water Quality (Surface and Ground)
- Invasive, Non-native Species
- Prime or Unique Farmlands
- Native American Religious Concerns
- Solid or Hazardous Wastes
- Wild Horses and Burros
- Energy Resources
- Wild and Scenic Rivers
- Wastes, Hazardous and Solid
- Water Quality, Surface and Ground

Impacts to the following resources, and other management considerations, were analyzed for the proposed action and are discussed in detail below.

- Air Quality
- Vegetation and Soils
- Cultural Resources
- Wetlands or Riparian Zones
- Wildlife
- Livestock Grazing
- Wilderness
- Outdoor Recreation
- Visual Resources
- Cumulative Impacts

## 3.1. Air Quality

Maricopa County does not meet Federal Health Standards for ambient air concentrations of particulate matter (dust). A $PM_{10}$ Nonattainment Area, measuring approximately 2,850 square miles and encompassing the Phoenix metropolitan area, has been established. Within this zone, the emission of airborne particulate matter 10 microns or less in diameter is regulated by Maricopa County's "Rule 310" under the Clean Air Act. The northern extremity of the project area is located one mile south of the $PM_{10}$ Nonattainment Area (Figure 8).

The emission of particulate matter into the atmosphere occurs from the natural action of wind but is exacerbated by surface disturbing human activities such as construction, clearing of land, and passage of vehicles. In the project area, the use of motorized vehicles for recreation activities is the primary source of particulate emissions. The volume by weight of particulate matter emitted by vehicles traveling over unpaved routes is estimated using a procedure published by the Environmental Protection Agency (Formula 1b, Appendix 4)

For discussion of the assumptions used in the analysis of air quality impacts posed by the no action and proposed action are presented below, refer to the sections 3.2 Vegetation and Soils and 3.8 Outdoor Recreation. Additionally, the following analysis was made using soil silt contents of 5%, 20%, and 40%, understanding that soil silt content is not uniform over the entire project area. A mean vehicle speed of 20 miles per hour and a soil moisture content of 1% were also assumed.

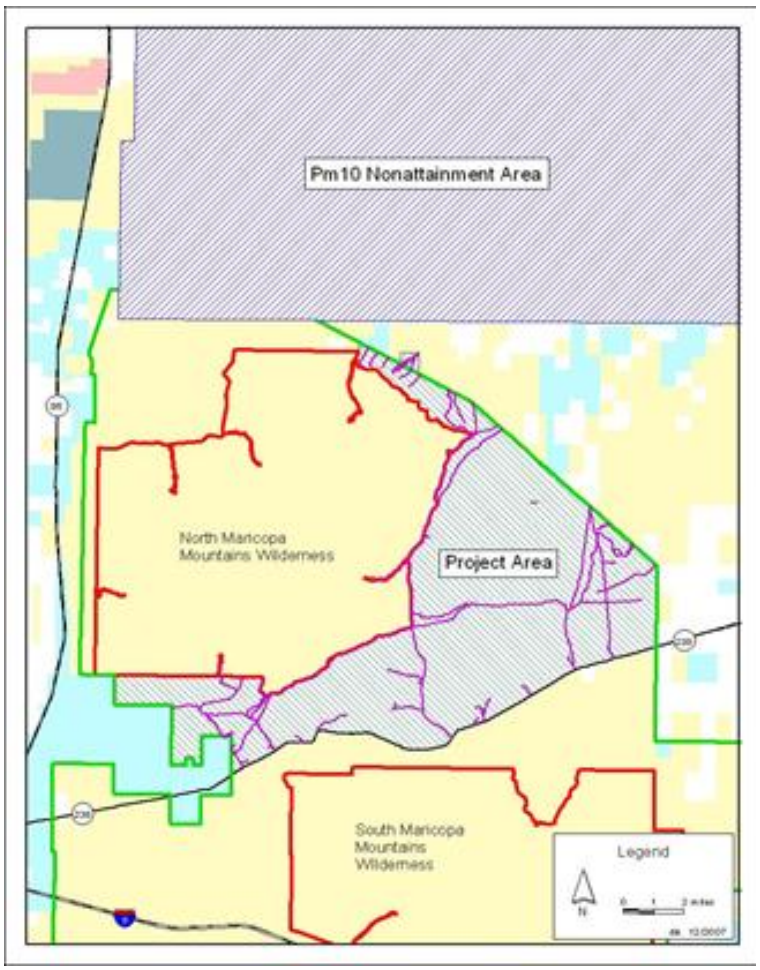


**Figure 8:** Geographic relationship of the project area to the Maricopa County $PM_{10}$ Non-attainment Area.

Finally, no data is available on the distances traveled by air borne particulates. Particulate matter originating at the extreme northern edge of the project area would have to travel at least one-mile to cross over the southern boundary of the $PM_{10}$ nonattainment area. The prevailing wind in the project area is from the southwest; however, particulate matter emitted by the passage of vehicles in the project area is not expected to travel into the Maricopa County $PM_{10}$ Nonattainment area to any appreciable degree.

The analysis presented below was made without consideration of chemical soil stabilizing agents and dust suppressants on the reduction of particulate emissions, and thus represents estimates of "maximum" impacts. Soil stabilizing agents would be used during construction and enhancement of vehicle routes, and dust suppressants would be used for periodic maintenance of routes after project completion. Thus, the actual volumes of particulates emitted would be less than the maximum amounts calculated below, but the relative comparisons between alternatives would remain constant.

<u>No Action</u>

Under this alternative, the project area would remain closed to use by motorized vehicles, although such use may occur administratively, by permit, or through other authorizations.

No soil stabilization measures would be undertaken on primitive, dirt-surfaced vehicle routes, and particulate matter from areas where the surface "crust" has previously been broken by

vehicles would continue to be swept into the atmosphere, although the levels of such incidental dust would decrease as these routes naturally restore over time through the actions of precipitation and vegetation growth. Permitted uses are expected to result in the emission of 64.6 to 533.3 pounds of particulates annually (Table 2).

**Table 2:** Estimated weight (lbs.) of $PM_{10}$ emitted annually for soils of the project area by alternative and soil silt content.

| Soil Silt Content<br>Alternative | 5% | 20% | 40% |
|---|---|---|---|
| No Action | 64.6 | 265.5 | 533.3 |
| Proposed Action | 3,825.7 | 15,720.1 | 31,579.4 |

Proposed Action

Facilitated recreation and access improvements would be focused on the Butterfield Recreation Area and 6.4 miles of the Anza NHT would remain open for motorized use. Soils in both of these areas are gravelly, with soil silt contents at the lower end of the described range. Maximum particulate emissions are estimated to range from 3,825.7 pounds to 31,579.4 pounds annually (Table 2); however, because of the characteristically lower soil silt contents of Butterfield and Butterfield Pass areas, it is believed that actual emissions would be toward the lower end of this range.

## 3.2. Vegetation and Soils

The SDNM is within the Basin and Range physiographic region, typified by expansive and sparsely vegetated alluvial valleys above which jut generally northwest to southeast trending mountain ranges. Brown (1994) described the floral and faunal assemblage that characterizes western and south-central Arizona as the Sonoran Desert scrub biotic community, with portions of the project area included in the Lower Colorado River Valley and Arizona Upland subdivisions.

The Lower Colorado River Valley Subdivision is characterized by vast, nearly level expanses of creosotebush (*Larrea tridentata*), triangle-leaf bursage (*Ambrosia deltoidea*), and white bursage (*Ambrosia dumosa*) that are periodically dissected by sandy drainages sporadically lined by foothills paloverde (*Parkinsonia microphyllum*), ironwood (*Olneya tesota*) and wolfberry (*Lycium sp*.). The Arizona Upland Subdivision falls along the rocky slopes and bajadas of the North Maricopa Mountains and features the often dense cactus forests of giant saguaro (*Carnegia gigantea*), prickly pear and cholla (*Opuntia sp*.), and others that impart the popularly known images of the Sonoran Desert. No threatened or endangered species of plants are known to occur within the project area. More detailed lists and descriptions of the flora of the project area are found in Brown (1994).

Soils of the project area are generally classified as “Gunsight-Rillito-Denure” and are characterized as deep, gravelly to loamy soils that are nearly level and excessively well drained. These soils are formed in alluvium derived dominantly from mixed rocks of fan terraces, and often have a surface area predominantly covered by small pebbles or gravel. The silt content of these soils, as measured by the percentage passing through a number 200 sieve, ranges from 5%

to 40% depending upon soil depth (NRCS, 1997). Soils on the eastern side of the North Maricopa Mountains are generally deep, alluvial soils with soil silt contents toward the higher end of this range, and soils of the Butterfield Area are gravelly, with soil silt contents toward the low end of this range.

The fine textured, deep alluvial soils of the Anza NHT from the eastern boundary of the SDNM to the Wayside group area are particularly prone to erosion after the passage of numerous vehicles. Due to this vulnerability, this eleven-mile segment of the Anza NHT would be closed to motor vehicles under the proposed alternative.

No Action

Vegetation removal associated with construction of group areas and maintenance of vehicle routes would not occur. No impacts to vegetation resulting from implementation of the no action alternative are expected to occur.

The erosion of soils damaged by deep vehicle ruts and the actions of wind and water would continue in the short term (up to five years); however, in the long term (greater than five years) the continued erosion of soils would lessen as occasional precipitation acts to re-establish a protective "crust" over the ground surface. In some locations, rutted routes may continue to erode due to rainfall runoff; however, across the project area erosion due to the effects of wind and water acting upon vehicle damaged soils would be expected to become negligible.

Proposed Action

Vegetation removal associated with construction of group areas and stabilization and enhancement of vehicle routes would occur to a minor degree (up to an estimated 100 plants overall, principally creosote bush and triangle leaf bursage). Construction of the Butterfield Campground would entail vegetation removal as well; however, no trees such as paloverde or ironwood would be removed. No saguaro would be removed, although small numbers (up to an estimated 50 plants overall) of smaller cactus such as hedgehog (Ferrocactus sp.) and cholla would be removed. These would be replanted in this or other locations of the project area, if possible.

The erosion of soils damaged by deep vehicle ruts and the actions of wind and water would be lessened as access routes used by motor vehicles at primary access points would be enhanced for better drainage of rainfall runoff and driving surfaces would be hardened and stabilized for traffic. Vehicle routes in remote locations would be permanently closed to vehicle traffic, allowing natural restoration and reduced erosion of damaged soils.

Additional removal of vegetation would be entailed by the construction of a trail adjacent to BLM Route 8003. Trimming or removal of individual plants, primarily creosote bush, triangle-leaf bursage, and cholla, would occur in an alignment of approximately 24 inches in width over a distance of approximately 6.4 miles. The trail would be aligned around dominant vegetation species such as paloverde, ironwood, and saguaro, and none of these trees or large cactus would be removed.

## 3.3. Cultural Resources

The project area is within the area of occupation of the prehistoric Hohokam cultural tradition (approximately 300 B.C. to 1500 A.D.), with the remains of large Hohokam settlements known to the west near Gila Bend and to the east on the Gila River Reservation. Numerous artifacts attributed to the Hohokam, including ceramic fragments, metates and manos for grinding grains, projectile points, and petroglyphs, are found in light density in this part of the SDNM.

The Gila River Pima, (*Akimel O'odham*), Papago (*Tohono O'odham*), and Maricopa (*PeePosh*) peoples gathered, hunted, and traveled through the project area from period 1500 A.D. to the present. Foot-based travel and trade was carried out along the path through the Maricopa Mountains for at least a millennium. The area of the eastern boundary of the North Maricopa Mountains Wilderness near the Margies Cove East Trailhead is occasionally used for harvesting of saguaro cactus fruit and other plants, an activity of great cultural importance to these peoples. In Spanish Colonial times, Father Kino and Father Sedelmayr traveled through the area. In 1775-1776, Captain Juan Bautista de Anza led an expedition of soldiers, settlers, and livestock across this area on his way to Northern (Alta) California. Congress designated the trail Anza followed as a National Historic Trail. This is a historic corridor that follows diary and journal entries made in Spanish Colonial times, from Nogales to San Francisco.

In the 19th century, many emigrant groups followed this same route to California. Mail and freight followed the flow of settlers. By 1850, the route was known as the "Southern Overland Route." This same route served as the common thread in an ever-changing story of human use along this segment of historic trail. Historians saw the cultural value of this route and have produced books and maps of the many trail users of this trail. Emigrants, gold seekers, trappers, mail and freight companies all used this route. The names of the Mormon Battalion Trail and the Butterfield Overland Stage Route were applied to this trail segment. Today, the Butterfield Overland Stage Route is under a feasibility study to determine if National Historic Trail status would be appropriate.

Impacts to cultural resources would be expected at some level under the Proposed Action. These impacts would result in physical damage from ground disturbance and visual intrusions. The proposed activities and projects will be carefully designed to avoid and/or reduce physical and visual impacts to cultural resources. Each construction project (action) would be reviewed for Section 106 to assess specific impacts to cultural resources. A number of previous cultural surveys were performed in this portion of the SDNM for specific projects. A list of those inventories completed in the project area may be found in Appendix 5. It is anticipated that additional inventory will be needed for the specific recreational developments and facilities outlined in this plan.

The cultural resource inventories would be completed prior to surface disturbing activities. Cultural resources will be avoided whenever possible. If avoidance is not possible, cultural resources will be evaluated and a treatment plan developed and implemented prior to surface disturbing activities.

No Action

Restoration of OHV damage to the Anza NHT would proceed by active management and natural means. Existing high side berms and route braiding of the historic trail would be obliterated. As no motorized use of the Anza NHT would occur, no new such impacts to the historic trail or to

adjacent cultural resources would be expected. The experience of passage over the Anza NHT would be lost for visitors unwilling, or unable, to reach the area by non-motorized means.

Saguaro fruit and other plant harvesting would continue by authorization from the SDNM Manager; no impact to known activities of traditional cultural importance would occur.

Proposed Action

A 17 mile segment of the Juan Bautista de Anza NHT lies within the SDNM. This same segment has been determined to be a "high potential route segment "and was allocated as a National Historic Trail Management Area. These criteria were met since this trail segment was determined to have the potential to provide a high quality recreational experience. The visitor would not have to work hard to experience vicariously what historic trail users felt.

Impacts to the Juan Bautista de Anza NHT Management Area would most likely be due to physical damage and visual impacts because of the construction and operation of the proposed facilities. The proposed activities and projects associated with this plan will be carefully designed to avoid and/or reduce physical and visual impacts to the Anza NHT and its values.

The proposed projects under this alternative may directly or indirectly have a protective effect for the long term due to the restraint and limits placed on certain recreational activities. Motorized activities will be limited in some areas, which will have a protective effect.

Impacts to the Anza NHT from side berming and route braiding would not be entirely eliminated, but would be minimized by imposition of traffic standards such as one-way traffic flow and a speed limit. The installation of a cattle guard in Butterfield Pass would require a trench across the alignment of the Anza NHT that would measure approximately four feet in width, twelve feet in length, and three feet in depth. The experience of passage over this segment of the Anza NHT would be preserved for visitors unwilling, or unable, to reach the area by non-motorized means.

The construction of a 6.4-mile trail south of BLM Route 8003 through Butterfield Pass would preserve the experience of non-motorized travel not only over this portion of the Anza NHT, but also for such passage over the entire length of the Anza NHT in the SDNM.

No impact to known activities of traditional cultural importance would occur.

### 3.4. Wetlands or Riparian Zones

The project area does not contain perennial streams; however, several sandy, drainage washes that channel runoff during occasional thunderstorms crisscross the project area. The West Prong Waterman Wash is the major wash of the project area, averaging approximately 90 feet in width. The banks of these sandy washes are lined with foothill paloverde, blue paloverde (*Parkinsonia floridum*), ironwood, desert hackberry (*Celtis pallida*), and wolfberry, providing dense cover and forage for wildlife. Such areas are referred to as "xeroriparian" habitats. Under both alternatives, no impacts to intermittent rainfall runoff flows would occur; however, minor trimming and tree removal in xeroriparian habitats would occur. These impacts would result from installation of culverts and temporary low water crossings at small washes intersecting BLM Route 8004, and from construction of a low water crossing at the larger West Prong

Waterman Wash on route 8003. No fill of these washes would occur as a result of these activities.

No Action

No impacts to xeroriparian vegetation would occur.

Proposed Action

Under the proposed action, impacts to xeroriparian habitat would result from effects related to minor vegetation loss and installation of culverts and concrete pads at up to ten low water crossings. Up to three temporary low water crossings are expected at small washes intersecting BLM Route 8004 including one at the larger West Prong Waterman Wash. Use of low water crossings at these locations is needed to ensure safe motorized travel. Overall loss of xeroriparian substrate as a result of installing hardened crossings is expected to be less than ¼ acre and vegetation loss is expected to result primarily from trimming rather than removal. Therefore, function of xeroriparian habitat is expected to be preserved with loss attributed to water crossings being minor, as a result of the proposed action.

## 3.5. Wildlife

Brown (1994) described the faunal assemblage that characterizes the Sonoran Desertscrub biotic community. Commonly observed species of the project area include desert mule deer (*Odocoileus hemionus*), black-tailed jackrabbit (*Lepus californicus*), coyote (*Canis latrans*), round-tailed ground squirrel (*Spermophilus tereticaudus*), red-tailed hawk (*Buteo jamaicensis*), turkey vulture (*Cathartes aura*), white-winged dove (*Zenaida asiatica*), Gambel quail (*Lophortyx gambelii*), desert iguana (*Dipsosaurus dorsalis*), zebra-tailed lizard (*Callisaurus draconoides*), western whiptail (*Aspidoscelis tigris*), and diamondback rattlesnake (*Crotalus atrox*).

Perennial water sources for wildlife in the project area are largely restricted to man-made wildlife water catchments (Figure 9) and livestock waters (Figure 10). Wildlife water catchments are generally constructed and maintained by the Arizona Game & Fish Department while livestock waters are primarily constructed and maintained by grazing operators. Both are particularly important for big game, such as desert mule deer, but also serve a wide range of smaller mammals and birds. The lack of riparian habitat in the action area prevents effects to migratory bird species.

The Estrella Mountains to Sonoran Desert National Monument wildlife movement corridor runs northeast from the monument, in the vicinity of routes 8000 and 8000G (Figure 9), across Rainbow Valley to the Estrella Mountains (beyond map scale). Unimproved routes crossing the corridor at the periphery of the Monument have historically been open to motorized travel.

An Endangered Species Act (ESA) candidate and BLM sensitive species of interest in the project area is the Sonoran desert tortoise (*Gopherus morafkai*). Sonoran desert tortoise (SDT) habitat in Arizona has been classified into three categories based upon habitat and population characteristics (BLM, 1988a, 1990), with Category I being the most important. Forty-two percent of the project area lies within Category I desert tortoise habitat, and 13% is in Category II habitat (Figure 9, Table 4). The remaining 45% of the project area is uncategorized. Because of its special conservation status, the amount of habitat that BLM administers within the action

area (Figure 9). and the peripheral benefit to other wildlife (e.g. desert mule deer, desert bighorn sheep [*Ovis canadensis nelson*], mountain lion [*felis concolor*], etc.) from their consideration, the following analysis focuses on direct (i.e. caused by the action at the same time and place) and indirect (i.e. caused by the action later in time or farther away, but are reasonably foreseeable) effects to Sonoran desert tortoise individuals and habitat. Cumulative effects of the proposed action are discussed in Section 3.11 (below).

Direct effects to SDT can occur from off-highway vehicles (resulting in injury or death), interruption of movement and foraging, and removal as pets. Indirect effects may stem from impacts to vegetation used for cover and forage, fragmentation of contiguous habitat, and delayed mortality caused by handling stress, ingestion of plastics and other refuse left as litter (Averill-Murray and Averill-Murray, 2002; Cordery et al., 1993).

Existing roads within the project area fragment categorized SDT habitat primarily in low lying desert scrub areas. Using a standard width of 14 feet for unimproved dirt-surfaced vehicle tracks results in an estimated 152 acres of existing routes within the action area. Of these, approximately 82 acres occur in categorized SDT habitat. Placement of the majority of these routes in lowland areas (Figure 9) provides a buffer to tortoises, whose distribution is typically upslope in rockier areas. However, the degree of buffering would be expected to vary with seasonal precipitation resulting in favorable forage conditions in lower areas. The extent of routes, open or closed to public motor vehicle access in categorized tortoise habitat, is shown by alternative in Table 5.

No Action

Wildlife habitat would be maintained through a lack of development and reduced public motor vehicle access in the project area. The probability for wildlife–human interaction would also remain the same under the no action alternative. Further, the probability of encounters with Sonoran desert tortoises under the no action alternative would be less than under the proposed action.

Proposed Action

*Perennial Water Sources*

Excessive summer heat limits recreational activity in the Sonoran desert and would be expected to substantially reduce potential overlap between recreational users and wildlife's use of perennial water sources (Figures 9 and 10) during critical periods. During cool months recreational use in these areas would have greater potential for overlap, but the interaction would not be as stressful to wildlife as during summer months. The potential for negative effects would be further reduced through educational information provided at interpretive facilities. For these reasons, the expected impact to wildlife, resulting from the proposed action, would be minor.

*Wildlife Movement Corridors*

The Estrella Mountains to Sonoran Desert National Monument wildlife movement corridor (Figure 9) connects the northeast portion of the Monument to Rainbow Valley and the Estrella Mountains (beyond map scale). Within the corridor there are unimproved routes currently open

to motorized travel, which would remain open under the proposed action. Therefore, the proposed action would not increase the potential for effects to the corridor.

*Existing Routes*

Under the proposed action approximately 57.3 miles of routes would be open for public access by motor vehicle. In Category I desert tortoise habitat that translates to 29.5 miles of routes representing approximately 50 acres. In Category II desert tortoise habitat, 2.9 miles of routes (≈ 4 acres), which leaves 24.9 miles, representing approximately 42 acres, open to motorized use in uncategorized SDT habitat (Table 5). In contrast, 13.1 miles (≈ 22 acres) of existing vehicle routes would remain closed to motor vehicle use in Category I tortoise habitat; 3.2 miles (≈ 5 acres) would remain closed in Category II desert tortoise habitat; and 16.3 miles (≈ 28 acres), would remain closed in uncategorized tortoise habitat under the No Action alternative.

Based solely on mileage, the potential for impacts related to encounters between motorized users and individual tortoises from opening 29.5 of 42.4 total miles (70%, Table 5) of motorized routes in Category I habitat would increase. Negative effects to individuals from such encounters could include mortality, interrupted movement, removal as pets, delayed mortality from handling stress, etc., though encounters do not automatically equate to adverse impact. Because tortoises are typically distributed within rocky areas upslope of existing low lying routes (Figure 9) the potential for encounters is expected to be low. This coupled with increased user education (provided at interpretive facilities) is expected to promote a favorable outcome in the event of such an encounter. As a practical example, fourteen years of year-round administrative use of closed routes in the project area, by the patrolling SDNM Ranger, has yet to produce a SDT encounter. And, because BLM Rangers are educated on risks associated with close interaction with tortoises, such an encounter would not be expected to result in stress related mortality. In all, these circumstances are expected to produce a level of impact (Table 4 & 5) that falls between negligible (i.e. no known impacts, undetectable change, monument objects preserved) and minor (i.e. measurable direct effects, undetectable indirect effects, monument objects preserved) categories. Because these routes are pre-existing, this element of the proposed action would not result in additional loss of Category I habitat.

*New Route (non-motorized trail)*

Hand construction of a 24 inch wide by 6.4-mile foot trail (adjacent to BLM Route 8003) through Butterfield Pass (Figure 9) would result in new surface disturbance of approximately 1.8 acres of the existing 22,761 acres of Category I SDT habitat (Table 4). This amount of disturbance constitutes 0.008% of total Category 1 SDT habitat, resulting in a proportional increase in the probability for impacts to desert tortoise from interruption of movement, foraging and removal as pets by trail users, etc. Because the trail would be hand dug in lower elevations paralleling route 8003, the upper rocky elevations would remain undisturbed, resulting in little additional potential for human interaction with tortoises. This coupled with increased user education, provided by interpretive facilities, is expected to offset effects from trail construction and use. In all, trail construction and use is not expected to interfere with preservation of Monument objects or expected to result in more than minor localized disturbance.

*Dispersed Primitive Camp Sites (existing disturbance)*

Approximately ten primitive campsites would be placed in low lying areas of existing disturbance adjacent to BLM routes 8002B and 8002C, within SDT Category 1 habitat (Figure 9). Historic use of the area has created pockets of disturbance suitable for the placement of steel fire rings and picnic tables. Directed use of these areas for primitive camping would be expected to prevent expansion of the existing disturbance footprint. Because the primitive sites would be placed in low lying areas of existing disturbance, no more than negligible impact to individual tortoises or habitat would be expected.

*Development of Recreation Areas (existing and new disturbance)*

The proposed action seeks to promote education and stewardship through a balance of recreation opportunity and impact to Monument objects by development of parking, camping, sightseeing, and interpretive facilities in areas of existing disturbance, wherever possible, in order to minimize habitat loss. Historic use of the project area for livestock grazing and recreation is responsible for much of the disturbance pattern visible today. By using the existing road network and disturbed areas as the backbone for Monument development the existing road density, which is a key component of habitat loss/fragmentation, is largely maintained.

While the proposed action builds on existing disturbance, development within each of the Butterfield, Estrella-Wayside, and Christmas Camp areas (Figures 5, 6, 7, and 9) includes varying degrees of new disturbance. Table 11 provides estimates of existing and new disturbance in each recreation area relative to the project and Monument areas. In all but the Butterfield Recreation Area the amount of proposed new disturbance is less than existing. In the Butterfield area the amount of new disturbance (15.4 acres) is three times that of existing and twelve times the combined new disturbance for the Estrella-Wayside (1.14 acres) and Christmas Camp (0.14 acres) areas (Table 11). While this is substantial, relative to that proposed for the Estrella-Wayside and Christmas Camp areas, it constitutes only 0.028 and 0.003% of the total project and Monument areas, respectively.

Butterfield's development as the focal point for user interface with the Monument would constitute 92% of the 16.6 total acres of proposed new disturbance. The Butterfield area is best suited for this because it has more existing disturbance (≈ 5 acres) than Estrella-Wayside and Christmas Camp areas (≈ 3 acres each). Expanding user opportunity here is intuitive because it places new disturbance in the area of greatest historic use and existing disturbance. This coupled with the small area of new disturbance relative to the project (0.028%) and Monument (0.003%) areas suggests no more than minor impact to existing wildlife habitat. SDT individuals and habitat are further buffered by development in these low lying areas by their distribution in higher elevation habitat.

Existing disturbance estimates for the Estrella-Wayside and Christmas Camp areas (Figure 9) are similar (≈ 3 acres each) and lower than at the Butterfield area (≈ 5 acres, Table 11). Proposed new disturbance at Estrella-Wayside and Christmas Camp is also lower (1.14 and 0.14 acres, respectively). Less planned expansion of these areas is consistent with the relatively low amount of existing disturbance, which lends these areas to a more back country experience. As such, these areas would be expected to receive fewer visitations than the Butterfield area. Because the limited amount of new disturbance builds on areas of existing disturbance, effects would be localized and road density largely maintained. This and the relatively low contribution of new disturbance at the project (0.0003 to 0.002%) and Monument (0.00002 to 0.0002%) scale for

these two areas suggests no more than minor impacts to general wildlife and SDT Category 1 habitat.

**Table 4:** Approximate extent of desert tortoise habitat in the project area.

| SDT Habitat Category | General Project Area (acres) | % of Project Area | Unimproved Routes (miles) | Unimproved Routes (acres)* |
|---|---|---|---|---|
| I | 22,761 | 42 | 42.4 | 72 |
| II | 7,212 | 13 | 6.1 | 10 |
| III | 0 | 0 | 0 | 0 |
| Total Categorized Habitat | 29,973 | 55 | 48.5 | 82 |
| Total Habitat Not Categorized | 24,844 | 45 | 41.5 | 70 |
| Grand Total | 54,817 | 100 | 90 | 152 |

*Area of routes calculated using a standard route width of 14.0 feet.

**Table 5:** Approximate extent of open and closed routes in desert tortoise habitat for route enhancement and maintenance.

| SDT Habitat Category | No Action - Open | No Action - Closed | Proposed Action - Open | Proposed Action - Closed |
|---|---|---|---|---|
| | miles (acres) | miles (acres) | miles (acres) | miles (acres) |
| I | 0 | 42.4 (72) | 29.5 (50) | 13.1 (22) |
| II | 0 | 6.0 (10) | 2.9 (5) | 3.2 (5) |
| III | 0 | 0 | 0 | 0 |
| Total Categorized Habitat | 0 | 48.5 (82) | 29.5 (50) | 13.1 (22) |
| Total Uncategorized Habitat | 0 | 41.5 (70) | 24.9 (42) | 16.3 (28) |
| Grand Total | 0 | 90 (152) | 57.3 (97) | 32.6 (55) |

1: Minor differences in totals are due to rounding of decimals.
2: Area of routes calculated using a standard route width of 14.0 feet

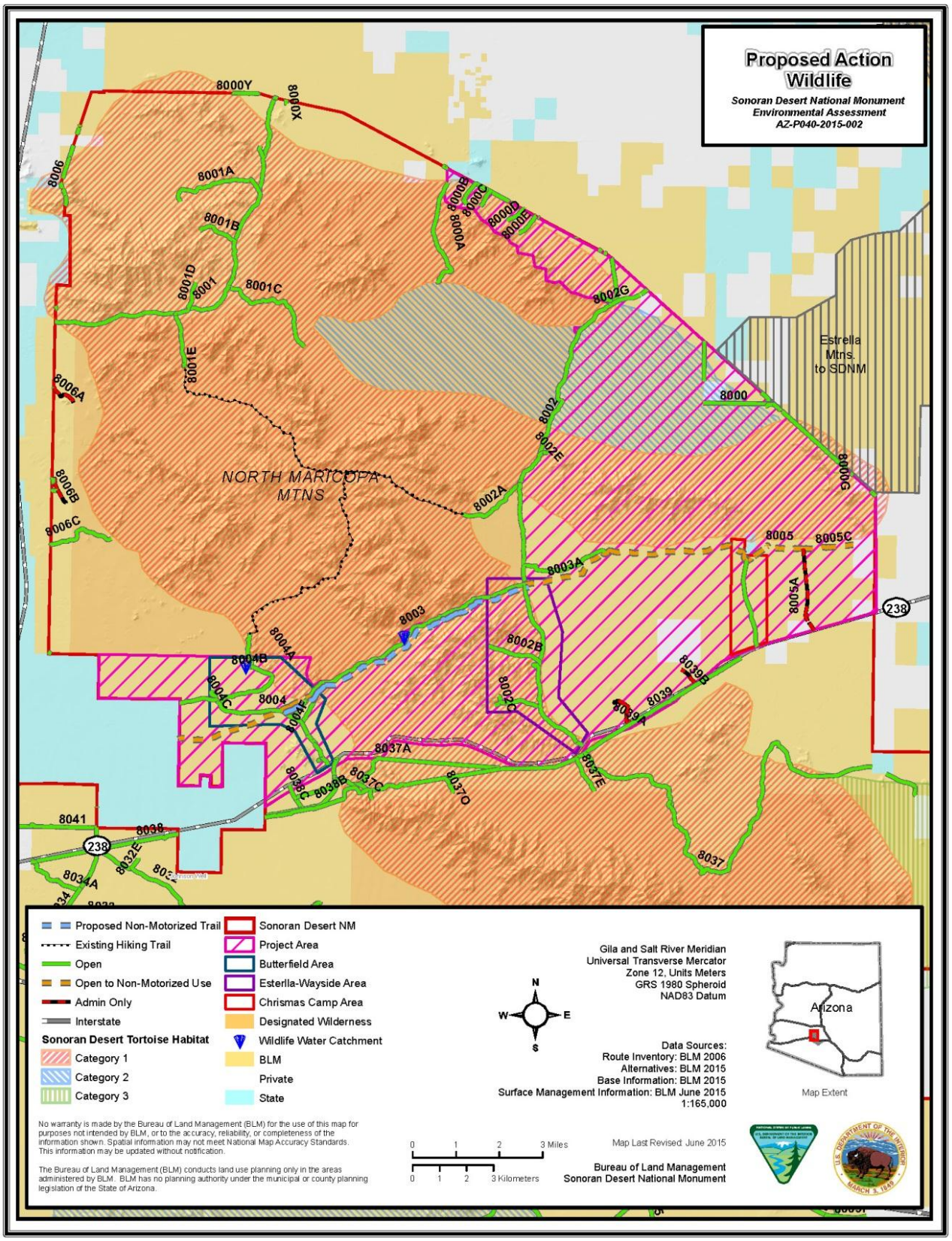


**Figure 9:** Sonoran desert tortoise habitat within the project area.

## 3.6. Livestock Grazing

The project area includes portions of three livestock grazing allotments (Table 6). Assessing the numbers of livestock actually grazing in the project area is difficult as stocking levels are allotment-wide and not specific to the project area. Nevertheless, although all three allotment grazing permits are for perennial operations, most grazing in the project area is seasonal in nature, with stocking numbers varying widely in correlation to rainfall amounts sufficient to stimulate growth of forage plants. Improper OHV use in the project area directly damages forage plants, and damages soils that support forage plants.

**Table 6:** Livestock grazing allotments in the project area.

| Allotment (acres) | Total Area (acres) | Portion in Project Area (acres) | Portion in Project (%) |
|---|---|---|---|
| Beloat | 176,653 | 7,953 | 5 |
| Bighorn | 169,313 | 10,979 | 6 |
| Conley | 118,465 | 35,885 | 30 |
| Total | 464,331 | 54,817 | 12 |

Seven livestock water developments are located in the project area (Figure 10): North Tank, North Tank Well, Fenceline Tank, Conley Tank, Gap Tank, Don Tank, and Gap Well. Gap Well is non-functional, and Gap Tank and Don Tank hold water only seasonally. The other four developments generally contain water year-round. All of these range water developments, but particularly the perennial waters have attracted increased recreational use such as OHV driving and target shooting as area visitation has increased. Livestock grazing operators have remarked that livestock increasingly are limited in their use of these water sources as such recreational activities prevent or drive livestock from critical water sources.

No Action

As vehicle routes of the project area would remain closed to motor vehicles, the use of OHVs and firearms at range water developments would be limited. There would continue to be limited disturbance of livestock around existing water sources.

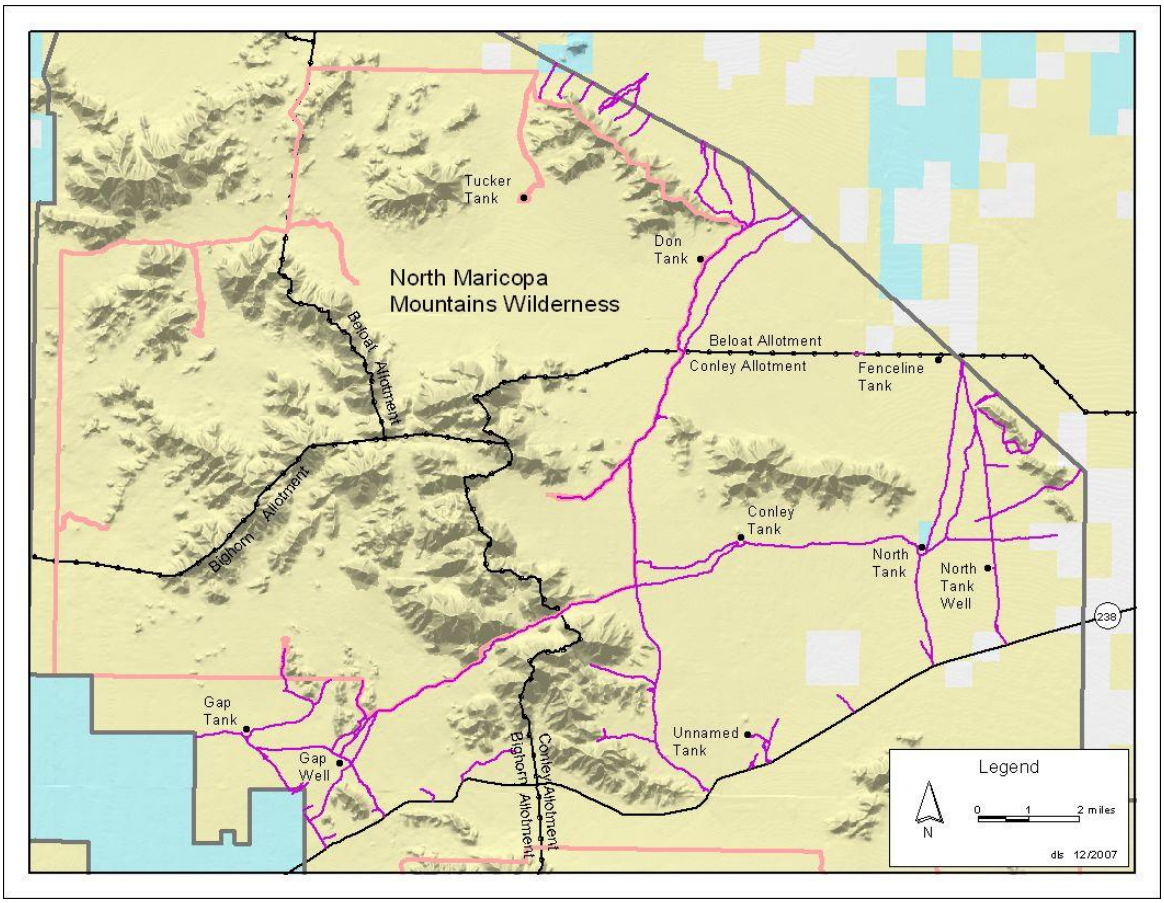


**Figure 10:** Livestock grazing allotments and range water developments of the project area.

Proposed Action

The proposed action may increase visitation to livestock waters and interactions with livestock. The proposed is expected to impacts to livestock grazing. Wilderness

The 63,200-acre North Maricopa Mountains Wilderness was designated by the *Arizona Desert Wilderness Act of 1990*. The project area abuts the North Maricopa Mountains Wilderness on three sides (Figure 2), but does not extend into wilderness. The 9.0-mile Margies Cove Trail traverses the wilderness from east to west and is accessed by a trailhead at each end. The 6.0-mile Brittlebush Trail extends from the southern boundary of the wilderness at the Brittlebush Trailhead and intersects with the Margies Cove Trail in the interior of the North Maricopa Mountains. A summary of wilderness boundary management statistics compiled during 1994-1996 documented 94 unauthorized motor vehicle entries (BLM, 2005b). Although such statistics have not been routinely kept and analyzed since, it is believed that unauthorized motor vehicle incursions into wilderness have increased from this rate.

Areas of public land that are not designated as wilderness may still exhibit wilderness character. Such character is defined as an area of federal land that exhibits a high degree of naturalness where the imprint of human activity is substantially unnoticeable, and provides outstanding opportunities for solitude or a primitive and unconfined type of recreation. These features must

be reasonably present, of sufficient value and need, and be practical to manage (BLM, 2003a and 2003b).

No Action

No public access by motor vehicle would be provided to the eastern and southern sides of the North Maricopa Mountains Wilderness, preventing ready access to the Margies Cove East and Brittlebush trailheads. Recreational use of the eastern and southern ends of these trails by hikers and equestrians would be maintained to negligible levels due to long distances from motorized access points, limiting opportunities for primitive and unconfined recreation in wilderness. Naturalness and solitude in wilderness would be enhanced as access to these wilderness boundaries by motor vehicle would be prohibited. Unauthorized motor vehicle incursions into wilderness abutting the project area would be eliminated with the unavailability of vehicle access to the wilderness boundaries.

Proposed Action

Impacts to primitive and unconfined recreation opportunities of the North Maricopa Mountains Wilderness resulting from implementation of the proposed action are expected to be minimal. Impacts to naturalness and solitude resulting from vehicle traffic along the eastern boundary of the North Maricopa Mountains Wilderness would be greater in the proposed action as BLM Route 8002 would not be improved and marketed as an OHV driving opportunity, although the route will remain open for public access by motor vehicle.

Impacts to naturalness resulting from construction of a 6.4-mile trail adjacent to BLM Route 8003 would result in a direct impact to naturalness on approximately 1.8 acres, or 0.02%, (width of approximately 24 inches for 6.4 miles). Opportunities for primitive recreation would be increased by the addition of this non-motorized trail.

A comparison of estimated impacts to the wilderness character for each of the alternatives described is presented in Table 7.

**Table 7:** Estimated impacts to naturalness, solitude, and opportunities for primitive and unconfined recreation, by alternative.

| Alternative | Naturalness (% of unit) | Solitude (% of unit) | Primitive Recreation |
|---|---|---|---|
| No Action | 0.0 | 0.0 | Maintained |
| Proposed | 1.0 | 5.0 | Increased |

## 3.7. Outdoor Recreation

Outdoor recreation opportunities in the project area are managed using the Recreation Opportunity Spectrum (ROS), a system of establishing management goals for a given area based on visitor perceptions of access, remoteness, naturalness, and social interaction characteristics. The experience, setting, and activity opportunities of the project area are classified and managed as “Roaded Natural” along the northern and southern boundaries of the project area, which are defined by linear travel corridors (the El Paso Natural Gas Pipeline road on the north and

Maricopa Road on the south), and as "Semi-Primitive Motorized" over the interior of the project area (Figure 11). Detailed descriptions of each ROS Class are provided in Appendix 6. No shift of ROS opportunity class is expected to result from implementation of the proposed action.

Visitation numbers for the project area have not been collected and analyzed sufficiently to provide an accurate count of recreation use. General estimates drawn from permitted group uses and field observations may be made, however. Visitation is low during the hot summer months from May 1 through October 30, although visitation during summer has increased during the last five years over previous periods. Visitation during the summer months is estimated to be ten individuals per day for 185 days, or approximately 1,850 visitor-days. Visitation during the cool weather season from November 1 through April 30 is substantially higher, and is estimated at 10 individuals per day during 185 weekdays and 600 individuals per weekend for 25 weekends, or 16,850 visitor days. Total annual visitation to the project area is approximately 18,700 visitor days.

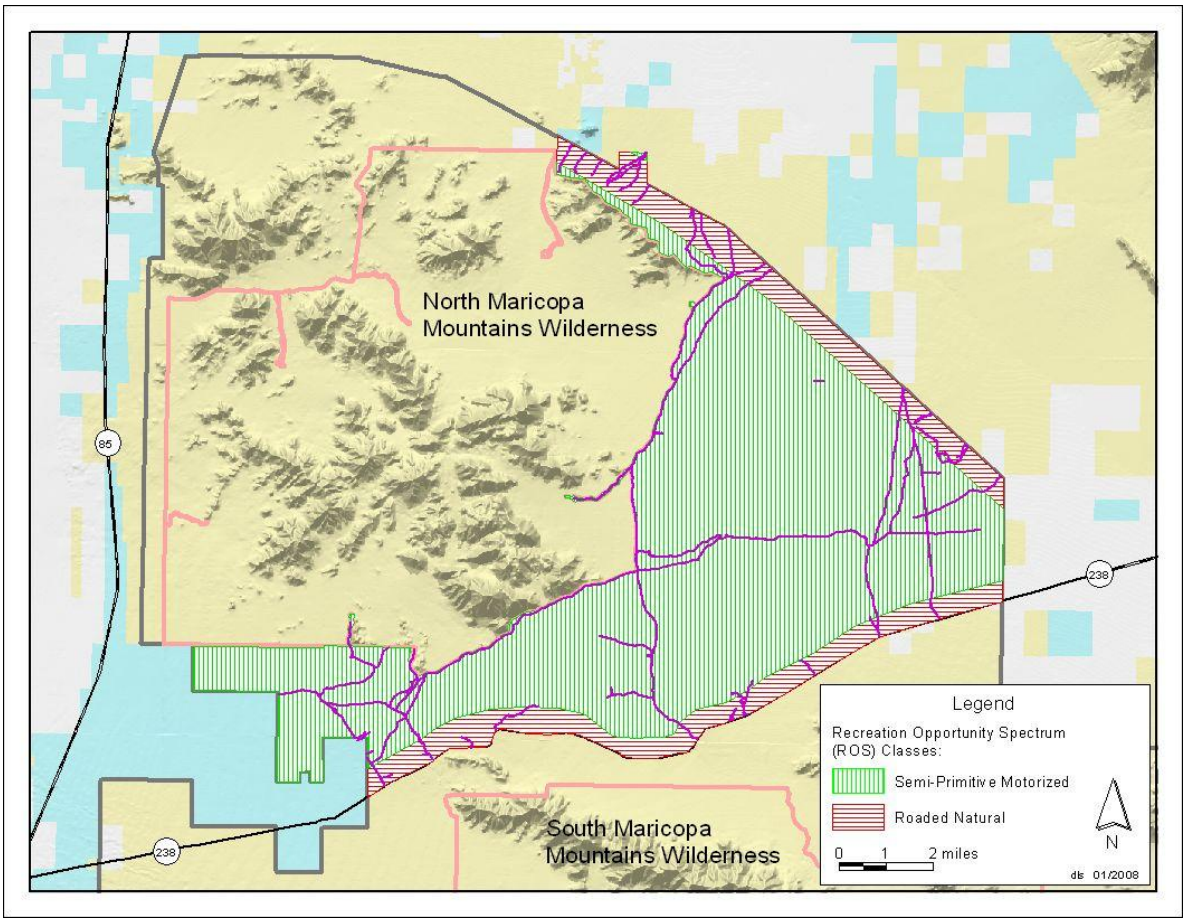


**Figure 11:** Recreation Opportunity Spectrum (ROS) classes of the project area.

Visitation has increased during the last five years over previous periods. Visitation during the summer months is estimated to be ten individuals per day for 185 days, or approximately 1,850 visitor-days. Visitation during the cool weather season from November 1 through April 30 is substantially higher, and is estimated at 10 individuals per day during 185 weekdays and 600 individuals per weekend for 25 weekends, or 16,850 visitor days. Total annual visitation to the project area is approximately 18,700 visitor days.

Recreation use consists of wilderness hiking; camping by recreational vehicle; hunting for upland birds (quail and dove) and big game (desert mule deer); driving for scenic viewing by ATV, motorcycle, and 4x4 vehicles; and camping activities by boy scout and church groups. The latter particularly consist of large (up to 300 individuals) groups that have an affinity for the Anza NHT and use the area extensively for events that include hiking, re-enactments, camping, and outdoor skills education. These groups principally come from the Mesa-Gilbert area on the eastern side of the Phoenix metropolitan area; however, Boy Scout and church groups valley-wide and from Tucson and Casa Grande also visit the area. Wilderness visitation is light, but not quantified.

All visitors to the project area arrive by motor vehicle. The primary destinations from Maricopa Road are Gap Well (approximately 1.5 miles), the Estrella area, and Christmas Camp (approximately 2.5 miles). From the Estrella area, motorized users frequently travel to Gap Well through the Butterfield Pass (approximately 12.5 miles), to the Margies Cove East Trailhead (approximately 8.5 miles), and to the El Paso Natural Gas Pipeline (approximately 14.0 miles). Many visitors also travel from camps established for up to two weeks duration. In the absence of visitor survey data, only general characterizations of recreation use can be made; however, the estimated statistics presented in Table 8 are offered for general analysis.

No Action

Recreation use by individuals, including hikers, hunters, and vehicle-based campers, would be impacted as motorized access would remain prohibited. Ten Special Recreation Permits would continue to be issued annually to groups numbering up to 200 individuals each. As each group usually camps for one night, annual visitation would be approximately 4,000 visitor days (10 * 200 * 2).

**Table 8:** Estimate of miles traveled by visitors to the project area, 2007.

| Distance Traveled by Motor Vehicle | % of Total Visitation | Number of Visitor Days | Miles Traveled[1] | Comments |
|---|---|---|---|---|
| < 10 Miles | 40 | 7,480 | 18,700[2] | Group events, casual visitors, wilderness trailheads, hunters, 4X4, ATV, motorcycle. |
| 10 to 20 miles | 15 | 2,805 | 28,050[3] | |
| 20 to 50 miles | 30 | 5,610 | 280,500 | |
| > 50 miles | 15 | 2,805 | 140,250 | |
| Total | 100 | 18,700 | 467,500 | |

1: Estimated using upper limit of "Distance Traveled" category.
2: Estimated using average of four visitors per vehicle to convert visitor days to vehicles.
3: Estimated using average of two visitors per vehicle to convert visitor days to vehicles.

**Table 9:** Miles of routes open and closed to motorized use, and estimated miles travelled annually, by alternative.

| Alternative | Open (miles) | Closed (miles) | New Construction (miles) | Miles Traveled Annually |
|---|---|---|---|---|
| No Action | 0 | 63.5 | 0 | 5,000 |
| Proposed Action | 48.6 | 14.9 | 2 | 296,083 |

Proposed Action

Under the proposed action 7.3-mile segment of the Anza NHT (BLM Route 8003) from the intersections with BLM routes 8002 and 8004 would remain open for motorized use. Approximately 63% of the existing level of motorized use is expected to visit the SDNM upon completion of the project, yielding an estimate of 296,083 miles travelled annually.

Table 9 shows the number of motorized routes re-opened under the proposed action versus the no action.

The construction of a 6.4-mile trail adjacent to BLM Route 8003 through Butterfield Pass would enhance recreation opportunities by providing, and segregating, motorized and non-motorized recreational uses of the Anza NHT. A non-motorized historic trail experience would be offered over the entire 18.1-mile distance of the Anza NHT on the SDNM, and a motorized trail experience would be offered for a 7.3-mile segment of the Anza NHT for those unable, or unwilling, to access the historic trail by non-motorized means.

## 3.8. Visual Resources

Visual resource management (VRM) classes have been determined for the project area as illustrated in Figure 12 and enumerated in Table 10. Thirty-one percent of the project area is classified as VRM II, 15% the project area is classified as VRM III, and 54% is classified as VRM IV. In areas managed as VRM II, management activities may cause visible change to the existing character of the landscape; however, such changes should not attract attention. Under VRM III, change to the landscape may attract attention, but should not be dominant, and under VRM IV, management activities may cause change to the existing character of the landscape that dominates the observer's attention, but these impacts are mitigated to the extent possible (BLM, 1986).

No Action

Under the No Action Alternative, no impacts to the existing visual character of the landscape will occur.

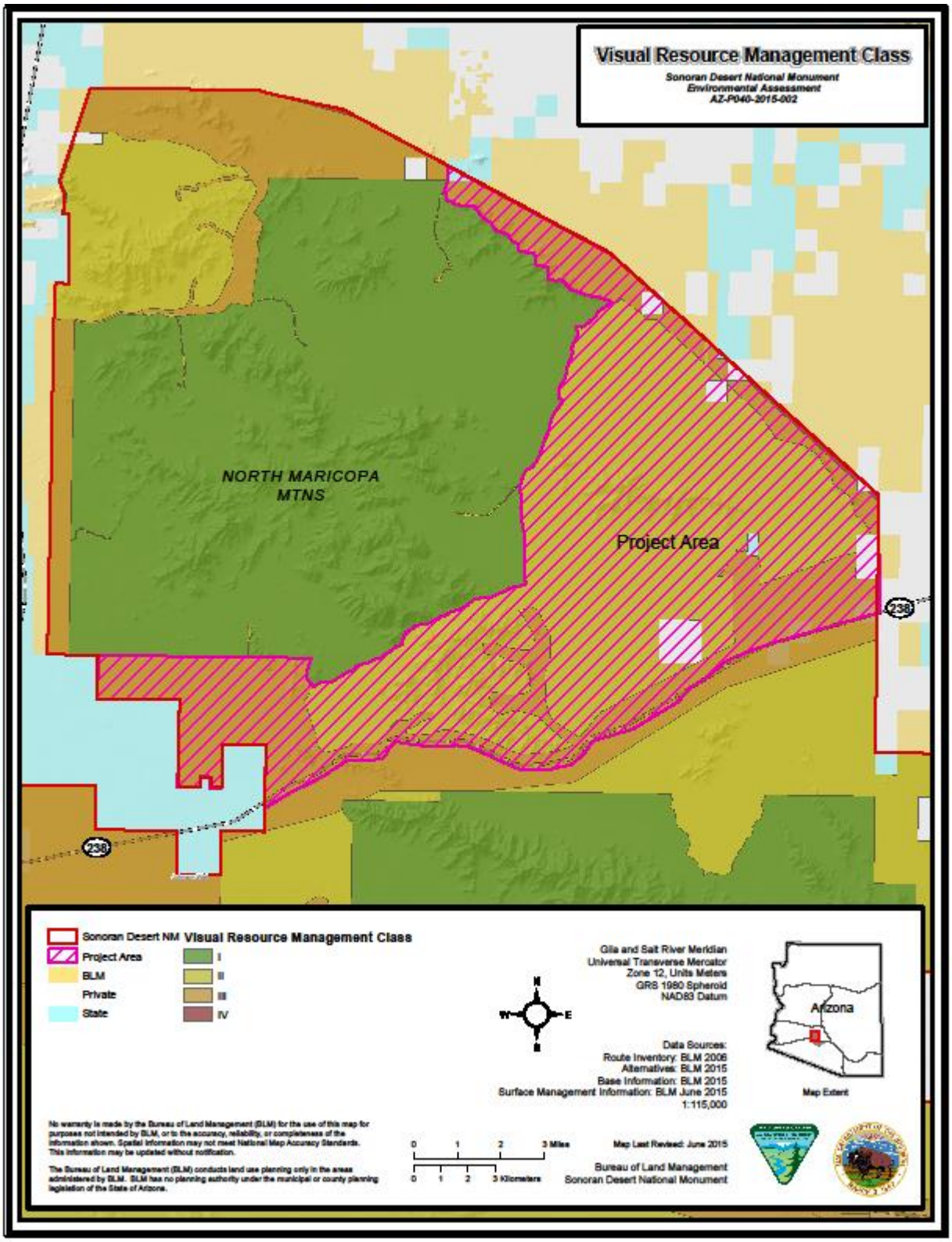


**Figure 12:** Visual resource management classes of the project area.

**Table 10:** Approximate extent of visual resource management classes of the project area.

| VRM Class | Acres |
|---|---|
| I | 0 |
| II | 35038 |
| III | 18431 |
| IV | 0 |
| Total | 53469 |

Proposed Action

Construction and presence of facilities associated with the Butterfield and Estrella Recreation areas will pose "weak" to "moderate" contrasts with the existing VRM II classified landscape. Access route stabilization and enhancement may pose a slightly noticeable visible impact to the line of the landscape; however, no change to the form, color, and texture of the landscape is anticipated. Construction of the Christmas Camp Group Area, including stabilization and enhancement of BLM Route 8003, will pose "weak" contrasts with the existing VRM IV classified landscape.

## 3.9. Energy Resources

There are no known reserves of coal, oil, geothermal potential, or other sources of energy present in the project area. A utility corridor (El Paso Natural Gas Pipeline) containing a high voltage electrical transmission line and natural gas pipeline is located adjacent to the northern boundary of the project area; however, the actions considered in both the no action and proposed action alternatives described herein pose no known or expected impacts to this utility corridor.

Pursuant to Executive Order 13213, "Actions to Expedite Energy-Related Projects," and BLM policy relating to documentation of impact to energy resources (BLM, 2002c), the no action and proposed alternatives considered herein were determined to have no direct or indirect adverse impact on energy development, production, supply, and/or distribution.

## 3.10. Cumulative Impacts

Cumulative impacts are incremental when added to other past, present, and reasonably foreseeable future actions, regardless of source. Cumulative impacts potentially resulting from implementation of the no action and the proposed action were identified for cultural, wildlife, wilderness, and outdoor recreation resources as described below. Cumulative impacts were not necessarily present for all of these resources under both alternatives. See Table 11 for summation of existing and new impacts expected with the project.

**Table 11**: Incremental Increase in New Ground Disturbance

| Proposed Action Element | Existing Disturbance[1] (acres) | New Disturbance[1] (acres) | New Project Area Disturbance (%) | New SDNM Disturbance (%) |
|---|---|---|---|---|
| Butterfield Recreation Area | 4.83 acres | 15.36 acres | 0.028 | 0.003 |
| Estrella Recreation | 3.06 acres | 1.14 acres | 0.002 | 0.0002 |

| Area | | | | |
|---|---|---|---|---|
| Christmas Camp Recreation Area | 2.99 acres | 0.14 acres | 0.0003 | 0.00002 |
| Total Acreage | 10.88 acres | 16.64 acres | 0.030 | 0.003 |

1: Acreages are estimates of existing and new disturbance associated with specific actions proposed for each area and are not an estimate of total disturbance within the project area.

No Action

An additive cumulative impact would accrue to wildlife resources, particularly desert tortoise, resulting from indefinite restriction of public motorized access to the 54,817-acre project area. The project area is adjacent to the 63,200-acre North Maricopa Mountains Wilderness, where use by motor vehicles is prohibited. Continued prohibition of motor vehicle access to the project area maintains a larger, contiguous area of wildlife habitat where impacts from motor vehicle use such as noise, reduction of vegetation used for cover and forage, habitat fragmentation, and mortality from motor vehicles or removal as pets would not occur.

An additive cumulative impact would accrue to wilderness resources resulting from indefinite restriction of public motorized access to the project area. The sights and sounds of human activity would be expected to remain low throughout the contiguous wilderness-project area, leading to enhanced naturalness, solitude, and opportunities for primitive and unconfined types of recreation.

Cumulative impacts to opportunities for outdoor recreation, particularly off-highway driving on primitive, unmaintained vehicle routes of the SDNM, would not increase from implementation of the no action alternative.

Proposed Action

*Cultural*

Cumulative impacts would accrue to cultural resources from the presence of one additional vehicle route intersecting the alignment of the Anza NHT in the vicinity of North Tank. This vehicle route intersection poses an additive reduction to the historic character of the Anza NHT represented by a surface disturbance of approximately 15 feet in width across the trail alignment.

*Wildlife*

Under the proposed action an additive cumulative impact would accrue to wildlife resources in the project area, particularly desert tortoise habitat from lifting the restriction on ≈ 57 miles of motorized routes, development of recreation areas (≈ 17 acres), and installing a non-motorized hiking trail (1.8 acres, Figure 9). Impacts would include reduction of vegetation available for use as cover and forage, habitat fragmentation, and direct or indirect mortality to wildlife from encounters with motor vehicles and users. A variable (with season) but additive cumulative impact to wildlife would also be expected from increased sights and sounds of human activity.

The Sonoran Valley Parkway Project (SVPP) is a reasonably foreseeable action with the potential to impact wildlife in the project area. The SVPP seeks a BLM right-of-way to be used for construction and operation of a proposed two to six-lane (15 to18-mile) Parkway. The

Parkway would run from Goodyear to Mobile in Rainbow Valley and connect residents of annexed lands of Goodyear's Sonoran Valley Planning Area, near the community of Mobile, for emergency services. The path of the proposed Parkway travels north from Highway 238 and parallels the lower half of the SDNM's northeast side. This alignment would fragment wildlife habitat in Rainbow Valley and bisect the Estella Mountains to SDNM wildlife movement corridor (Figure 9). Cumulative impacts from construction and use of the Parkway would be consistent with, but much greater in scale, than those from this proposed action. The scope of the SVPP was sufficient to warrant an environmental impact statement (DOI-BLM-AZ-P020-2011-013-EIS), which can be viewed online at:

http://www.blm.gov/az/st/en/prog/lands/svpp-eis.html

*Recreation*

The development of facilitated recreation opportunities at the Butterfield, Estrella, and Christmas Camp areas represents an additive cumulative impact to the availability of such opportunities throughout the SDNM. The current limited capacity for camping, parking, picnicking, and staging for hiking opportunities represented by the small trailhead facilities of the SDNM would be expanded by the addition of the proposed recreation facilities. Cumulative impacts accruing due to increased opportunities for motorized access would increase with the implementation of the proposed action alternative.

## 4. Persons and Agencies Consulted

This environmental assessment was made available for public review and comment. The following entities were notified by e-mail or postal mail as to the availability of this document for review and comment:

Ak-Chin Indian Community
Anza Society
Anza Trail Coalition of Arizona
Anza Trail Foundation
Arizona Desert Bighorn Sheep Society
Arizona Game and Fish Department
Arizona Fox Trotter Association
Arizona Motorcycle Riders Association
Arizona Off-Highway-Vehicle Advisory Group
Arizona State Parks Department
Arizona Trail Riders
Arizona Wilderness Coalition
Arizona Zoological Society
BLM Arizona Resource Advisory Council
Blue Ribbon Coalition
Boy Scouts of America, Grand Canyon Council
Center for Biological Diversity
City of Goodyear
City of Maricopa
City of Yuma
Congressman Raul Grijalva, U.S. Representative, Arizona District 3
Gila River Indian Community
Huachuca Audubon Society
Jeep Expeditions Group
Keith Cattle, LLC; Conley Allotment
Christopher and Kimmel Dalley; Beloat Allotment
Maricopa Audubon Society
National Park Service (Anza Office)
Oregon-California Trails Association

Pam Foti, PhD.; Professor and Chair; Department of Geography, Planning and Recreation; Northern Arizona University
Partnerships for the National Trail System
Public Employees for Environmental Responsibility
UTZ Enterprises, Inc (John Utz); Big Horn Allotment
Salt River Pima-Maricopa Indian Community
County Board of Supervisors, District 5
The Hopi Tribe
The Sierra Club, Grand Canyon Chapter
The Wilderness Society
Tohono O'odham Nation
Town of Buckeye
Town of Gila Bend
Tucson Audubon Society
Western Watersheds Project
Yuma Audubon Society

Additionally, the following media outlets were also notified as to the availability of this document for public review and comment:

Arizona Republic
Casa Grande Dispatch
High Country News
Land Letter

## Appendix 1. SDNM Objects

| Objects as Described in Presidential Proclamation 7397 | Monument Objects | Characteristics | Protection Criteria |
|---|---|---|---|
| The Sonoran Desert National Monument is a magnificent example of untrammeled Sonoran desert landscape. The area encompasses a functioning desert ecosystem with an extraordinary array of biological, scientific, and historic resources. The most biologically diverse of the North American deserts, the Monument consists of distinct mountain ranges separated by wide valleys, and includes large saguaro cactus forest communities that provide excellent habitat for a wide range of wildlife species. | Functioning Desert Ecosystem | **Physical**: Distinct mountain ranges separated by wide valleys.<br><br>**Ecological:** Sonoran desert landscape with properly functioning desert ecosystem, large saguaro cactus forest communities, habitat for a wide range of wildlife species. | Prevent avoidable soil loss.<br><br>Maintain properly functioning plant communities defined by structure, cover, diversity, composition, and presence or absence of invasive species |
| The Monument's biological resources include a spectacular diversity of plant and animal species. The higher peaks include unique woodland assemblages, while the lower elevation land offer one of the most structurally complex examples of palo verde/mixed cacti association in the Sonoran Desert. The dense stands of leguminous trees and cacti are dominated by saguaros, palo verde trees, ironwood, prickly pear, and cholla. Important natural water holes known as tinajas, exist throughout the Monument. The endangered acuna pineapple cactus is also found in the Monument. | Diversity of Plant and Animal Species | **Biological:** Distinct mountain ranges separated by wide valleys.<br><br>**Physical:** Tinajas<br><br>**Ecological:** Woodland assemblages, structurally complex palo verde-mixed cacti association, dens stands of leguminous trees and cacti. | Maintain normal variation in plant composition, diversity, and abundance of native species, diversity of niches, and landscape-level structural complexity. |

| Objects as Described in Presidential Proclamation 7397 | Monument Objects | Characteristics | Protection Criteria |
|---|---|---|---|
| The most striking aspect of the plant communities within the Monument are [sic] the abundant saguaro cactus forest. The saguaro is a signature plant of the Sonoran desert. Individual saguaro plants are indeed magnificent, but a forest of these plants together with the wide variety of trees, shrubs, and herbaceous plant that make up the forest community, is an impressive site [sic] to behold. The saguaro cactus forests within the Monument are a national treasure, rivaling those within the Saguaro National Park. | Saguaro Cactus Forests | **Biological:** Saguaro<br><br>**Ecological:** Plant communities; saguaro cactus forests; wide variety of trees, shrubs, and herbaceous plants. | Maintain age class and stand structure and density. Ensure suitable nurse plants are present and saguaro recruitment is adequate for cactus forest sustainability. |
| The rich diversity, density, and distribution of plants in the Sand Tank Mountains area of the Monument is especially striking and can be attributed to the management regime in place since the area was withdrawn for military purposes in 1941. In particular, while some public access to the area is allowed, no livestock grazing has occurred for nearly 50 years. To extend the extraordinary diversity and overall ecological health of the Sand Tank [sic] Mountains area, land adjacent and with biological resources similar to the area withdrawn for military purposes should be subject to a similar management regime to the fullest extent possible. | Sand Tank Mountains | **Physical:** Sand Tank Mountains<br><br>**Ecological:** Diversity, density, and distribution of plants. | Maintain normal variation in diversity, density, and distribution of plants. |

| Objects as Described in Presidential Proclamation 7397 | Monument Objects | Characteristics | Protection Criteria |
|---|---|---|---|
| The Monument contains an abundance of packrats middens, allowing for scientific analysis of plant species and climates in past eras. Scientific analysis of midden [sic] shows that the area received far more precipitation 20,000 years ago, and slowly became more arid. Vegetation for the area changed from juniper-oak-pinion pine woodland to the vegetation found today in the Sonoran Desert, although a few plants from the more mesic period, including the Kofa Mountain barberry, Arizona rosewood, and junipers, remain on higher elevations of north-facing slopes. | Scientific Analysis pf Plant Species and Climates. | **Biological:** Packrat middens, mesic period, Kofa Mountain barberry, Arizona rosewood, junipers. | Protect packrat middens, dry caves or rock shelters, and relic species. Within established guidelines, make middens available for scientific study and analysis. |
| The lower elevations and flatter areas of the Monument contain the creosote-bursage plant community. This plant community thrives in the open expanses between the mountain ranges, and connects the other plant communities together. Rare patches of desert grassland can also be found throughout the Monument, especially in the Sand Tank Mountains area. The washes in the area support a much denser vegetation community than the surrounding desert, including mesquite, ironwood, palo verde, desert honeysuckle, chuperosa, and desert willow, as well as a variety of herbaceous plants. This vegetation offers the dense cover bird species need for successful nesting, foraging, and escape, and birds heavily use the washes during migration. | Vegetation Communities:<br><br>Creosote Bush-Bursage, Desert Grasslands, and Washes. | **Biological:** Mesquite, ironwood, palo verde, desert honeysuckle, chuperosa, desert willow, herbaceous plants.<br><br>**Physical:** Sand Tank Mountains.<br><br>**Ecological:** Creosote-bursage plant community, desert grassland, densely vegetated wash communities. | Prevent avoidable soil loss.<br><br>Maintain properly functioning plant communities as defined by structure, cover, diversity, composition, invasive species, desert washed-bank stability, woody over story, and continuity of vertical structure. |

| Objects as Described in Presidential Proclamation 7397 | Monument Objects | Characteristics | Protection Criteria |
|---|---|---|---|
| The diverse plant communities present in the Monument supports a wide variety of wildlife, including the endangered Sonoran pronghorn, a robust population of desert bighorn sheep, especially in the Maricopa Mountains area, and other mammalian species such as mule deer, javelin, mountain lion, gray fox, and bobcat. Bat species within the Monument include the endangered lesser long-nosed bat, the California leaf-nosed bat, and the cave myotis. Over 200 species of [song] birds are found in the Monument, including 59 species known to nest in Vekol Valley area. Numerous species of raptors and owls inhabit the Monument, including the elf owl and the western screech owl. The Monument also supports a diverse array of reptiles and amphibians, including the Sonoran desert tortoise and red-backed whiptail. The BLM has designated approximately 25,000 acres of land in the Maricopa Mountains area as critical habitat for the desert tortoise. The Vekol Valley and Sand Tank Mountain areas contain especially diverse and robust populations of amphibians. During summer rainfall events, thousands of Sonoran green toads in the Vekol Valley can be heard moving around and calling out. | Wildlife | **Biological:** Sonoran pronghorn, desert bighorn sheep, mule deer, javelin, bobcat, bat species (including lesser-nosed bat, California leaf-nosed bat, and cave myotis), 200 species of songbirds, raptors, owls (including elf owl and western screech owl), red-backed whiptail, Sonoran green toads, critical habitat for Sonoran desert tortoise.<br><br>**Physical:** Maricopa Mountains, Vekol Valley, Sand Tank Mountains.<br><br>**Ecological:** Diverse plant communities. | Maintain viable populations of wildlife species, focusing, as appropriate, on foraging habitat, hiding cover, nesting/roosting habitat, escape cover, and thermal cover.<br><br>Prevent avoidable loss of special status species. |

| Objects as Described in Presidential Proclamation 7397 | Monument Objects | Characteristics | Protection Criteria |
|---|---|---|---|
| The Monument also contains many significant archeological and historic sites, including rock art sites, lithic quarries, and scattered artifacts. Vekol Wash is believed to have been an important prehistoric travel and trade corridor between the Hohokam and tribes located in what is now Mexico. Signs of large villages and permanent habitat sites occur throughout the area, and particularly along the bajadas of the Table Top Mountains. Occupants of these villages were the ancestors of today's O'odham, Quechan, Cocopah, Maricopa, and other tribes. The Monument also contains a much used trail corridor 23 miles long in which are found remnants of several important historic trails, including the Juan Batista de Anza National Historic Trail (NHT), the Mormon Battalion Trail and the Butterfield Overland Stage Route. | Archaeological and Historic Sites | **Cultural:** Archaeological and historic sites, rock art sites, lithic quarries, scattered artifacts, large villages, permanent habitat sites, Anza NHT corridor, Mormon Battalion Trail, Butterfield Overland Stage Route.<br><br>**Physical:** Vekol Wash, bajadas, Table Top Mountains. | Reduce threats and resolve conflicts from natural and human-caused degradation affecting integrity of sites and settlement clusters, site condition context, setting, stability, and capacity to yield scientific information. |

1: Not all of the Monuments Objects occur within the project area.

## Appendix 2. Route Designations

| Definitions of Final Route Decision: |
|---|
| **Open** = Available to all transportation modes year round, including motorized and non-motorized uses |
| **Limited to Non-motorized Use Only** = Route available for use by hiking, livestock, bicycles and hand carts |
| **Limited to Non-motorized / Non-mechanized Use Only** = Route available for use by hiking and livestock use only |
| **Limited to Admin Use Only** = Route closed to public use, only administrative uses are allowed |
| **Maintenance Intensity = Maintenance levels defined in BLM Travel Management Manual 1626 and Handbook 8342.** |

Below is the list of routes that were temporarily closed in 2008 that were designated open or limited in 2012. They were analyzed during the writing of the Sonoran Desert National Monument Resource Management Plan, 2012 and the rationale for the decision is listed for each route.

| Route # | Final Route Decision | BLM Asset Type | Maint. Intensity | Rationale for decision | 43 CFR 8342.1-a | 43 CFR 8342.1-b | 43 CFR 8342.1-c | 43 CFR 8342.1-d |
|---|---|---|---|---|---|---|---|---|
| 8000 | Open | Road | 3 | Open to allow access to the north end of the SDNM for all uses. Continued use minimizes effects to resources by avoiding creation of a new road leading to new disturbance. Air quality would be managed programmatically through a dust management regime focused on hardening/palliatives, voluntary compliance with posted speed limits and education. | **X** | **X** | **X** | |
| 8000A | open | Primitive Road | 1 | Opening allows access to wilderness -"cherry stemmed" out by Congress. C.1 Desert Tortoise and Big Horn | **X** | **X** | **X** | **X** |

| Route # | Final Route Decision | BLM Asset Type | Maint. Intensity | Rationale for decision | 43 CFR 8342.1-a | 43 CFR 8342.1-b | 43 CFR 8342.1-c | 43 CFR 8342.1-d |
|---|---|---|---|---|---|---|---|---|
| | | | | sheep habitat managed programmatically, through adaptive management. Designation of this route as primitive road would allow for low levels of visitation capacity without disturbing critical resources. Sign maintenance along route will be key component to management of motorized uses. | | | | |
| 8000B | open | Primitive Road | 1 | Opening provides access for camping, hunting and wilderness. Easily accessible from gas pipeline road. C.1/2 Desert Tortoise and Big Horn sheep habitat managed programmatically, through adaptive management. Route would allow for use capacity without the need to disturb another area by creating or using another access route. Designation of this route as primitive road would allow for low levels of visitation capacity without disturbing critical resources. Impacts from target shooting would be addressed by a follow up plan to address reopening the temporary OHV closure area. | **X** | **X** | **X** | **X** |
| 8000C | open | Primitive Road | 1 | Opening provides access for camping, hunting and wilderness. Easily accessible from gas pipeline road. C.1/2 Desert Tortoise and Big | **X** | **X** | | |

| Route # | Final Route Decision | BLM Asset Type | Maint. Intensity | Rationale for decision | 43 CFR 8342.1-a | 43 CFR 8342.1-b | 43 CFR 8342.1-c | 43 CFR 8342.1-d |
|---|---|---|---|---|---|---|---|---|
| | | | | Horn sheep habitat managed programmatically, through adaptive management. Route would allow for use capacity without the need to disturb another area by creating or using another access route. Designation of this route as primitive road allows for low levels of visitation capacity without disturbing critical resources. Impacts from target shooting would be addressed by a follow up plan to address reopening the temporary OHV closure area. | | | | |
| 8000D | open | Primitive Road | 1 | Opening provides access for camping, hunting and wilderness. Easily accessible from gas pipeline road. C.1/2 Desert Tortoise and Big Horn sheep habitat managed programmatically, through adaptive management. Route would allow for use capacity without the need to disturb another area by creating or using another access route. Designation of this route as primitive road allows for low levels of visitation capacity without disturbing critical resources. Impacts from target shooting would be addressed by a follow up plan to address reopening the temporary | **X** | **X** | | |

| Route # | Final Route Decision | BLM Asset Type | Maint. Intensity | Rationale for decision | 43 CFR 8342.1-a | 43 CFR 8342.1-b | 43 CFR 8342.1-c | 43 CFR 8342.1-d |
|---|---|---|---|---|---|---|---|---|
| | | | | OHV closure area. | | | | |
| 8000E | open | Primitive Road | 1 | Opening provides access for camping, hunting and wilderness. Easily accessible from gas pipeline road. C.1 and C.2 Desert Tortoise and Big Horn sheep habitat managed programmatically, through adaptive management. Route allows for use capacity without the need to disturb another area by creating or using another access route. Designation of this route as primitive road would allow for low levels of visitation capacity without disturbing critical resources. | **X** | **X** | | |
| 8000Y | Admin Use Only | Primitive Road | 1 | Limiting access to administrative on a power pole maintenance road parallel to the gas pipeline would reduce vehicle use in C-1 desert tortoise habitat, thus potentially improving it. | **X** | | | |
| 8000S | open | Primitive Road | 1 | Opening allows access for hunting, camping and wilderness. C.1 Desert Tortoise and Big Horn sheep habitat managed programmatically, through adaptive management. Designation of this route as primitive road allows for low levels of visitation capacity without disturbing critical resources. | **X** | **X** | **X** | **X** |

| Route # | Final Route Decision | BLM Asset Type | Maint. Intensity | Rationale for decision | 43 CFR 8342.1-a | 43 CFR 8342.1-b | 43 CFR 8342.1-c | 43 CFR 8342.1-d |
|---|---|---|---|---|---|---|---|---|
| | | | | Sign maintenance along route will be key component to management of motorized uses. | | | | |
| 8000X | open | Primitive Road | 1 | Opening would allow for access to camping, hunting. Habitat will be managed programmatically, through adaptive management. Designation of this route as primitive road allows for low levels of visitation capacity without disturbing critical resources. | **X** | **X** | **X** | **X** |
| 8002 | open | Primitive Road | 1 | Opening allows access from pipeline road to Margie's Cove Trailhead. Effects to critical resources would be minimized through ability to complete spot maintenance due to erosion. Maintenance could include route hardening to maintain air quality. | **X** | **X** | **X** | |
| 8002B | open | Primitive Road | 1 | Opening provides vehicle based camping/hunting opportunity with access to remote hiking opportunity. Bighorn sheep movement corridor would be improved by closing route on the other side of the mountain (8039D). | | **X** | | |
| 8002C | open | Primitive Road | 1 | Opening provides vehicle based camping/hunting opportunity with access to remote hiking opportunity. Bighorn sheep movement corridor would be improved by closing route on the other side of the mountain | | **X** | | |

| Route # | Final Route Decision | BLM Asset Type | Maint. Intensity | Rationale for decision | 43 CFR 8342.1-a | 43 CFR 8342.1-b | 43 CFR 8342.1-c | 43 CFR 8342.1-d |
|---|---|---|---|---|---|---|---|---|
| | | | | (8039D). | | | | |
| 8002D | open | Primitive Road | 1 | Open to provide camping opportunity along a main access road, but still be far away enough from the main road to avoid being disturbed by dust and vehicles. Allowing camping away from the main road can improve safety for campers with children and pets due to vehicle-human/animal collision hazard potential. C-1 desert tortoise habitat would be maximized in more remote locations. Allowing camping along these roads would potentially allow more contact between tortoise and humans, but would be contained to higher use areas. The same philosophy applies to the bighorn sheet movement corridor which is in the area. The area is pre-disturbed by camping and containing it here is preferable. | **X** | **X** | | |
| 8002E | open | Primitive Road | 1 | Opening allows access to hunting and camping. C.1 Desert Tortoise and Big Horn sheep habitat managed programmatically, through adaptive management. Designation of this route as primitive road would allow for continued use without disturbing | | **X** | | |

| Route # | Final Route Decision | BLM Asset Type | Maint. Intensity | Rationale for decision | 43 CFR 8342.1-a | 43 CFR 8342.1-b | 43 CFR 8342.1-c | 43 CFR 8342.1-d |
|---|---|---|---|---|---|---|---|---|
| | | | | critical resources. Provides access to camping at base of a mountain. | | | | |
| 8002F | open | Primitive Road | 1 | Open to provide hunter access to check for game presence at/near the wildlife water. Visitors would be prevented, by state law, from staying in the area for camping or long term use, thus minimizing effects on wildlife and vegetation near the guzzler. | **X** | **X** | | |
| 8002G | open | Primitive Road | 1 | Opening will allow access to North Maricopa Wilderness and Margie's Cove East Trailhead. C.1 Desert Tortoise and Big Horn sheep habitat managed programmatically, through adaptive management. Designation of this route as primitive road allows for low levels of visitation capacity without disturbing critical resources. Sign maintenance along route will be key component to management of motorized uses. Route provides closer proximity and access to Bullard Ave. | **X** | **X** | **X** | **X** |
| 8003 | open | Primitive Road | 1 | Opening allows access to wilderness boundary (has had good compliance) and Historic Trail Corridor. C.1 Desert Tortoise and Big Horn sheep habitat managed programmatically, through adaptive management. | **X** | **X** | **X** | **X** |

| Route # | Final Route Decision | BLM Asset Type | Maint. Intensity | Rationale for decision | 43 CFR 8342.1-a | 43 CFR 8342.1-b | 43 CFR 8342.1-c | 43 CFR 8342.1-d |
|---|---|---|---|---|---|---|---|---|
| | | | | Designation of this route as primitive road allows for low levels of visitation capacity without disturbing critical resources. Commercial jeep tours have been active in the past and possible for the future | | | | |
| 8004 | open | Road | 3 | Open to allow for access to Gap Well area and Butterfield Pass (west end). Designating main line as a road asset would allow for regular maintenance, addressing soil, water and air quality. Maintaining as a road asset allows for minimization of effects to different recreation types by making road easily accessible and minimizing inappropriate use by off-highway vehicles due to ease of use (no excitement) and easy access for law enforcement. Designating side spurs as primitive roads allows for compatible camping and day use without allowing cross-country use to access an interesting mountain. | **X** | **X** | **X** | |
| 8004A | open | Primitive Road | 1 | Open to allow access from Gap Well area or SR238 to Brittle Bush trailhead and dirt tank for grazing (Gap tank). Managing this existing route as a primitive road allows for spot maintenance, addressing soil, | **X** | **X** | | **X** |

| Route # | Final Route Decision | BLM Asset Type | Maint. Intensity | Rationale for decision | 43 CFR 8342.1-a | 43 CFR 8342.1-b | 43 CFR 8342.1-c | 43 CFR 8342.1-d |
|---|---|---|---|---|---|---|---|---|
| | | | | air and water resources. Use levels are expected to remain low; rising with population increase of the surrounding areas thus would not impede wildlife movement or lead to fragmentation. Most use on this primitive road would serve hiking and wilderness users, so conflict is not expected. | | | | |
| 8004B | open | Primitive Road | 1 | Open to allow for parking/camping, still vehicle accessible, in an area away from Gap Well. Effects to resources are minimized since route is out of desert tortoise habitat and is on the flat area of Big Horn sheep habitat. Camping footprint is being monitored and adaptive management will be employed to deal with changes in condition. Creosote Bursage vegetative community is abundant and not degraded by continued use. | **X** | **X** | **X** | |
| 8004C | open | Primitive Road | 1 | Opening allows access to hunting and to Gap Tank. Big Horn sheep habitat managed programmatically, through adaptive management. Designation of this route as primitive road allows for continued use without disturbing critical resources. | **X** | **X** | **X** | |

| Route # | Final Route Decision | BLM Asset Type | Maint. Intensity | Rationale for decision | 43 CFR 8342.1-a | 43 CFR 8342.1-b | 43 CFR 8342.1-c | 43 CFR 8342.1-d |
|---|---|---|---|---|---|---|---|---|
| 8004F | open | Primitive Road | 1 | Opening provides vehicle based camping/hunting opportunity with access to remote hiking opportunity. Bighorn sheep movement corridor would be improved by closing route on the other side of the mountain (8039D). | | **X** | | |
| 8005 | Non-Motorize Use Only | Primitive Road | 1 | Open to non-motorized use (including bicycle and hand cart) closed to motorized use. Conforms to provisions of NPS Comprehensive Plan for Anza NHT and Historic Trail corridor in general. Minimizes disruptions to bighorn sheep habitat. Designation as primitive road allows for spot maintenance to protect soil, air, water quality -- reduces erosion and silt runoff. | **X** | | **X** | |
| 8005A | open | Primitive Road | 1 | Opening provides brief backcountry driving experience and interaction with Historic Trails corridor. Programmatic management per NPS Comprehensive Plan provides cultural resources protection, e.g. interpretative signing and user education. | **X** | **X** | **X** | |
| 8005C | Non-Motorize Use Only | Primitive Road | 1 | Designation as a Primitive Road - Limited to Non-motorized use minimizes effects to wagon wheel ruts by 4wd vehicles and eliminates | **X** | | | |

| Route # | Final Route Decision | BLM Asset Type | Maint. Intensity | Rationale for decision | 43 CFR 8342.1-a | 43 CFR 8342.1-b | 43 CFR 8342.1-c | 43 CFR 8342.1-d |
|---|---|---|---|---|---|---|---|---|
| | | | | any future impacts to soils such as erosion in this erodible soil area as a result of allowing vehicles. Considering the NHT designation on this route, closure would be undesirable. | | | | |
| 8039A | Limited to Admin Use Only | Primitive Road | 1 | Limiting access to administrative use would greatly reduce impacts expected from camping, shooting and OHV use along SR238, a major travel corridor. Access is needed for wildlife management at a dirt water tank. | **X** | **X** | **X** | |
| 8039B | Limited to Admin Use Only | Road | 3 | Limited to admin access to allow access to a tire recycling center on private land. There is little room to turn around at the access gate, and no shoulder to park, therefore public use of this road should be restricted to avoid conflict with the recycling center. | **X** | **X** | **X** | |

## Appendix 3. Roads and Trails Terminology

BLM Technical Note 422, "Roads and Trails Terminology" (BLM, 2006b) provides standardized definitions of terms used for management of linear transportation features on public lands. Technical Note 422 is available to the public on the internet at:

http://www.blm.gov/pgdata/etc/medialib/blm/wo/Planning_and_Renewable_Resources/recreation_images/national_programs/travel_management/cttm_guidance___tech.Par.0030.File.dat/TN422.pdf

Following is a summary of definitions from Technical Note 422 relevant to this document:

**Maintenance Intensities—Transportation System Assets.** [In part] Maintenance Intensities provide operational guidance to field personnel on the appropriate intensity, frequency, and type of maintenance activities that should be undertaken to keep the route in acceptable condition and provide guidance for the minimum standards of care for the annual maintenance of a route....Maintenance Intensities do not describe route geometry, types of route, types of use, or other physical or managerial characteristics of the route. Those items are addressed as other descriptive attributes to a route. [There are five levels of Maintenance Intensity:]

*Level 0.* Maintenance Description: Existing routes that will no longer be maintained or declared as routes. Routes identified as Level 0 are identified for removal from the Transportation System entirely.

Maintenance Objectives:

- No planned annual maintenance
- Meet identified environmental needs
- No preventive maintenance or planned annual maintenance activities

*Level 1.* Maintenance Description: Routes where minimal (low-intensity) maintenance is required to protect adjacent lands and resource values. These roads may be impassable for extended periods of time.

Maintenance Objectives:

- Low (Minimal) maintenance intensity
- Emphasis is given to maintaining drainage and runoff patterns as needed to protect adjacent lands. Grading, brushing, or slide removal is not performed unless route bed drainage is being adversely affected, causing erosion.
- Meet identified resource management objectives
- Perform maintenance as necessary to protect adjacent lands and resource values
- No preventive maintenance
- Planned maintenance activities limited to environmental and resource protection
- Route surface and other physical features are not maintained for regular traffic

*Level 2.* RESERVED FOR POSSIBLE FUTURE USE

*Level 3.* Maintenance Description: Routes requiring moderate maintenance because of low-volume use (e.g., seasonally or year-round for commercial, recreational, or administrative access). Maintenance Intensities may not provide year-round access, but are intended to generally provide resources appropriate for keeping the route in use for the majority of the year.

Maintenance Objectives:

- Medium (Moderate) maintenance intensity
- Drainage structures will be maintained as needed. Surface maintenance will be conducted to provide a reasonable level of riding comfort at prudent speeds for the route conditions and intended use. Brushing is conducted as needed to improve sight distance when appropriate for management uses. Landslides adversely affecting drainage receive high priority for removal; otherwise, they will be removed on a scheduled basis.
- Meet identified environmental needs
- Generally maintained for year-round traffic
- Perform annual maintenance necessary to protect adjacent lands and resource values
- Perform preventive maintenance as required to generally keep the route in acceptable condition
- Planned maintenance activities should include environmental and resource protection efforts, annual route surface
- Route surface and other physical features are maintained for regular traffic

*Level 4.* RESERVED FOR POSSIBLE FUTURE USE

*Level 5.* Maintenance Description. Routes for high (Maximum) maintenance because of year-round needs, high-volume traffic, or significant use. Also may include routes identified through management objectives as requiring high intensities of maintenance or to be maintained open year- round.

Maintenance Objectives:

- High (Maximum) maintenance intensity
- The entire route will be maintained at least annually. Problems will be repaired as discovered. These routes may be closed or have limited access because of weather conditions but are generally intended for year-round use.
- Meet identified environmental needs
- Generally maintained for year-round traffic
- Perform annual maintenance necessary to protect adjacent lands and resource values
- Perform preventive maintenance as required to generally keep the route in acceptable condition
- Planned maintenance activities should include environmental and resource protection efforts, annual route surface
- Route surface and other physical features are maintained for regular traffic

**Off-Highway Vehicle (off-road vehicle).** Any motorized vehicle capable of—or designated for—travel on or immediately over land, water, or other natural terrain, excluding: (1) any nonamphibious registered motorboat; (2) any military, fire, emergency, or law enforcement vehicle while being used for emergency purposes; (3) any vehicle whose use is expressly authorized by the authorized officer, or otherwise officially approved; (4) vehicles in official use; and (5) any combat or combat support vehicle when used for national defense.

**Primitive Road**. A linear route managed for use by four-wheel-drive or high-clearance vehicles. These routes do not normally meet any BLM road design standards.

**Road**. A linear route declared a road by the owner, managed for use by low-clearance vehicles having four or more wheels, and maintained for regular and continuous use.

**Routes**. "Routes" represents a group or set of roads, trails, and primitive roads that represents less than 100% of the BLM transportation system. Generically, components of the transportation system are described as routes.

**Trail**. A linear route managed for human-powered, stock, or off-highway-vehicle forms of transportation or for historical or heritage values. Trails are not generally managed for use by four-wheel-drive or high-clearance vehicles.

**Transportation Linear Features.** "Linear features" represents the broadest category of physical disturbance (planned and unplanned) on BLM land. Transportation-related linear features include engineered roads and trails, as well as user-defined, nonengineered roads and trails created as a result of the public use of BLM land. Linear features may include roads and trails identified for closure or removal, as well as those that make up the BLM's defined transportation system.

## Appendix 4. Environmental Protection Agency, AP 42, Fifth Edition, "Compilation of Air Pollutant Emission Factors, Volume I, Chapter 13: Miscellaneous Sources; 13.2.2 Unpaved Roads, pp. 13.2.2-4 to 13.2.2-6." [http://www.epa.gov/ttn/chief/ap42/ch13/]

The following empirical expressions may be used to estimate the quantity in pounds (lb) of size-specific particulate emissions from an unpaved road, per vehicle mile traveled (VMT):

For vehicles traveling on unpaved surfaces at industrial sites, emissions are estimated from the following equation:

$$E = k\ (s/12)^a (W/3)^b \quad (1a)$$

and, for vehicles traveling on publicly accessible roads, dominated by light duty vehicles, emissions may be estimated from the following:

$$E = \frac{k\ (s/12)^a (S/30)^d}{(M/0.5)^c} - C \quad (1b)$$

where k, a, b, c and d are empirical constants (Reference 6) given below and

E = size-specific emission factor (lb/VMT)
s = surface material silt content (%)
W = mean vehicle weight (tons)
M = surface material moisture content (%)
S = mean vehicle speed (mph)
*C* = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear.

The source characteristics s, W and M are referred to as correction parameters for adjusting the emission estimates to local conditions. The metric conversion from lb/VMT to grams (g) per vehicle kilometer traveled (VKT) is as follows:

1 lb/VMT = 281.9 g/VKT

The constants for Equations 1a and 1b based on the stated aerodynamic particle sizes are shown in Tables 13.2.2-2 and 13.2.2-4. The PM-2.5 particle size multipliers (k-factors) are taken from Reference 27.

Table 13.2.2-2. CONSTANTS FOR EQUATIONS 1a AND 1b

| Constant | Industrial Roads (Equation 1a) | | | Public Roads (Equation 1b) | | |
|---|---|---|---|---|---|---|
| | PM-2.5 | PM-10 | PM-30* | PM-2.5 | PM-10 | PM-30* |
| k (lb/VMT) | 0.15 | 1.5 | 4.9 | 0.18 | 1.8 | 6.0 |
| a | 0.9 | 0.9 | 0.7 | 1 | 1 | 1 |
| b | 0.45 | 0.45 | 0.45 | - | - | - |
| c | - | - | - | 0.2 | 0.2 | 0.3 |
| d | - | - | - | 0.5 | 0.5 | 0.3 |
| Quality Rating | B | B | B | B | B | B |

*Assumed equivalent to total suspended particulate matter (TSP)
"-" = not used in the emission factor equation

Table 13.2.2-2 also contains the quality ratings for the various size-specific versions of Equation 1a and 1b. The equation retains the assigned quality rating, if applied within the ranges of source conditions, shown in Table 13.2.2-3, that were tested in developing the equation:

Table 13.2.2-3. RANGE OF SOURCE CONDITIONS USED IN DEVELOPING EQUATION 1a AND 1b

| Emission Factor | Surface Silt Content, % | Mean Vehicle Weight | | Mean Vehicle Speed | | Mean No. of Wheels | Surface Moisture Content, % |
|---|---|---|---|---|---|---|---|
| | | Mg | ton | km/hr | mph | | |
| Industrial Roads (Equation 1a) | 1.8-25.2 | 1.8-260 | 2-290 | 8-69 | 5-43 | 4-17[a] | 0.03-13 |
| Public Roads (Equation 1b) | 1.8-35 | 1.4-2.7 | 1.5-3 | 16-88 | 10-55 | 4-4.8 | 0.03-13 |

[a] See discussion in text.

As noted earlier, the models presented as Equations 1a and 1b were developed from tests of traffic on unpaved surfaces. Unpaved roads have a hard, generally nonporous surface that usually dries quickly after a rainfall or watering, because of traffic-enhanced natural evaporation. (Factors influencing how fast a road dries are discussed in Section 13.2.2.3, below.) The quality ratings given above pertain to the mid-range of the measured source conditions for the equation. A higher mean vehicle weight and a higher than normal traffic rate may be justified when performing a worst-case analysis of emissions from unpaved roads.

The emission factors for the exhaust, brake wear and tire wear of a 1980's vehicle fleet (*C*) was obtained from EPA's MOBILE6.2 model [23]. The emission factor also varies with aerodynamic size range

as shown in Table 13.2.2-4

Table 13.2.2-4. EMISSION FACTOR FOR 1980'S VEHICLE FLEET EXHAUST, BRAKE WEAR AND TIRE WEAR

| Particle Size Range[a] | *C*, Emission Factor for Exhaust, Brake Wear and Tire Wear[b] lb/VMT |
|---|---|
| $PM_{2.5}$ | 0.00036 |
| $PM_{10}$ | 0.00047 |
| $PM_{30}$[c] | 0.00047 |

[a] Refers to airborne particulate matter (PM-x) with an aerodynamic diameter equal to or less than x micrometers.
[b] Units shown are pounds per vehicle mile traveled (lb/VMT).
[c] PM-30 is sometimes termed "suspendable particulate" (SP) and is often used as a surrogate for TSP.

It is important to note that the vehicle-related source conditions refer to the average weight, speed, and number of wheels for all vehicles traveling the road. For example, if 98 percent of traffic on the road are 2-ton cars and trucks while the remaining 2 percent consists of 20-ton trucks, then the mean weight is 2.4 tons. More specifically, Equations 1a and 1b are *not* intended to be used to calculate a separate emission factor for each vehicle class within a mix of traffic on a given unpaved road. That is, in the example, one should *not* determine one factor for the 2-ton vehicles and a second factor for the 20-ton trucks. Instead, only one emission factor should be calculated that represents the "fleet" average of 2.4 tons for all vehicles traveling the road.

Moreover, to retain the quality ratings when addressing a group of unpaved roads, it is necessary that reliable correction parameter values be determined for the road in question. The field and laboratory procedures for determining road surface silt and moisture contents are given in AP-42 Appendices C.1 and C.2. Vehicle-related parameters should be developed by recording visual observations of traffic. In some cases, vehicle parameters for industrial unpaved roads can be determined by reviewing maintenance records or other information sources at the facility.

In the event that site-specific values for correction parameters cannot be obtained, then default values may be used.In the absence of site-specific silt content information, an appropriate mean value from Table 13.2.2-1 may be used as a default value, but the quality rating of the equation is reduced by two letters. Because of significant differences found between different types of road surfaces and between different areas of the country, use of the default moisture content value of 0.5 percent in Equation 1b is discouraged. The quality rating should be downgraded two letters when the default moisture content value is used. (It is assumed that readers addressing industrial roads have access to the information needed to develop average vehicle information in Equation 1a for their facility.)

The effect of routine watering to control emissions from unpaved roads is discussed below in Section 13.2.2.3, "Controls". However, all roads are subject to some natural mitigation because of rainfall and other precipitation. The Equation 1a and 1b emission factors can be extrapolated to annual

## Appendix 5. Cultural Survey Record.

A total of five cultural surveys have been performed in the project area as summarized below:

| Project Number | Project Name | Area (acres) | Comments |
|---|---|---|---|
| BLM-020-12-93-164 | Boy Scout Camporee (BLM staff, 1993). | 116 | No new sites recorded. Butterfield Overland Stage Route would not be utilized for camping by the Scouts. No surface disturbing activities were allowed. |
| BLM-026-11-95-108 | Archaeological Survey of the Butterfield Stage Overland Route, Gila Bend to Mobile, Maricopa County, Arizona (T. Kathleen Henderson and Mark R. Hackbarth, Northland Research, Inc., 1995). | 247 | Six sites recorded, all of which are located at some distance from the current proposed project area. |
| BLM-020-12-03-257 | Maricopa Road Right-of-Way Fence Line Survey. An Archaeological Survey of Nine Miles of Maricopa Road East of Gila Bend, Maricopa County, Arizona (BLM staff and John Lindly, 2003). | 17.5 | Two sites were previously recorded, but lie outside this activity area. |
| BLM-200-12-07-294 | Cultural Resources Survey Along Selected Roads and Routes in the Sonoran Desert National Monument (Peter W. Bungart and Anne E. Raney, 2007, in draft). | 1,477 | Twelve sites recorded. No sites located within this project proposal area. |
| BLM-200-12-07-292 | Survey along Sonoran Desert National Monument Road Restoration Projects (BLM staff, 2007). | 132 | No sites were recorded within the restoration project areas. Sites near the proposed work were flagged to make sure no inadvertent damage would be done to them. |

## Appendix 6. Recreation Opportunity Spectrum Class Descriptions.

| Opportunity Class | Experience Opportunity | Setting Opportunity | Activity Opportunity |
|---|---|---|---|
| **Primitive** | Opportunity for isolation from the sights and sounds of man, to feel a part of the natural environment, to have a high degree of challenge and risk, and to use outdoor skills. | Area is characterized by essentially unmodified natural environment of fairly large size. Concentration of users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of man-induced restrictions and controls. Only facilities essential for resource protection are used. No facilities for comfort or convenience of the user are provided. Spacing of groups is informal and dispersed to minimize contacts between groups. Motorized use within the area is not permitted. | Camping, hiking, climbing, enjoying scenery or natural features, nature study, photography, spelunking, hunting (big game, small game, upland birds, waterfowl), ski touring and snowshoeing, swimming, diving (skin and scuba), fishing, canoeing, sailing, and river running (non-motorized craft). |
| **Semi-Primitive Non-motorized** | Some opportunity for isolation from the sights and sounds of man, but not as important as for primitive opportunities. Opportunity to have high degree of interaction with the natural environment, to have moderate challenge and risk, and to use outdoor skills. | Area is characterized by a predominantly unmodified natural environment of moderate to large size. Concentration of users is low, but there is often evidence of other area users. On-site controls and restrictions may be present, but are subtle. Facilities are provided for the protection of resource values and the safety of users only. Spacing of groups may be formalized to disperse use and limit contacts between groups. Motorized use is not permitted. | Camping, hiking, climbing, enjoying scenery or natural features, nature study, photography, spelunking, hunting (big game, small game, upland birds, waterfowl), ski touring and snowshoeing, swimming, diving (skin and scuba), fishing, canoeing, sailing, and river running (non-motorized craft). |

| Opportunity Class | Experience Opportunity | Setting Opportunity | Activity Opportunity |
|---|---|---|---|
| **Semi-Primitive Motorized** | Some opportunity for isolation from the sights and sounds of man, but not as important as for primitive opportunities. Opportunity to have high degree of interaction with the natural environment, to have moderate challenge and risk, and to use outdoor skills. Explicit opportunity to use motorized equipment while in the area. | Area is characterized by a predominantly unmodified natural environment of moderate to large size. Concentration of users is low, but there is often evidence of other area users. On-site controls and restrictions may be present, but are subtle. Facilities are provided for the protection of resource values and safety of users only. Spacing of groups may be formalized to disperse use and limit contacts between groups. Motorized use is permitted. | Same as above, plus the following: ORV use (4WD, Dune Buggy, Dirt Bike, Snowmobile, Power Boating). |
| **Roaded Natural** | About equal opportunities for affiliation with other user groups and for isolation from sights and sounds of man. Opportunity to have a high degree of interaction with the natural environment. Challenge and risk opportunities are not very important except in specific challenging activities. Practice of outdoor skills may be important. Opportunities for both motorized and non-motorized recreation are present. | Area is characterized by a generally natural environment with moderate evidence of the sights and sounds of man. Resource modification and utilization practices are evident, but harmonize with the natural environment. Concentration of users is low to moderate with facilities sometimes provided for group activity. On-site controls and restrictions offer a sense of security. Rustic facilities are provided for user convenience as well as for safety and resource protection. Conventional motorized use is provided for in construction standards and design of facilities. | All activities listed previously plus the following: picnicking, rock collecting, wood gathering, auto touring, downhill skiing, snow play, ice skating, water skiing and other water sports, hang gliding, interpretive use, rustic resorts, and organized camps. |

| Opportunity Class | Experience Opportunity | Setting Opportunity | Activity Opportunity |
|---|---|---|---|
| **Rural** | Opportunities to experience affiliation with individuals and groups are prevalent as is the convenience of sites and opportunities. These factors are generally more important than the natural setting. Opportunities for wild land challenges, risk taking, and testing of outdoor skills are unimportant, except in those activities involving challenge and risk. | Area is characterized by substantially modified natural environment. Resource modification and utilization practices are obvious. Sights and sounds of man are readily evident, and the concentration of users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for specific activities. Developed sites, roads and trails, are designed for moderate to high use. Moderate densities are provided far away from developed sites. Facilities for intensive motorized use are available. | All activities listed previously, plus the following: competitive games, spectator sports, bicycling, jogging, outdoor concerts, and modern resorts. |
| **Urban** | Opportunities to experience affiliation with individuals and groups are prevalent as is the convenience of sites and opportunities. Experiencing the natural environment, and the use of outdoor skills are largely unimportant. | Area is characterized by a highly modified environment, although the background may have natural elements. Vegetation is often exotic and manicured. Soil may be protected by surfacing. Sights and sounds of man, on-site, predominate. Large numbers of users can be expected. Modern facilities are provided for the use and convenience of large numbers of people. Controls and restrictions are obvious and numerous. Facilities for high intensity motor use and parking are present with forms of mass transit often available. | All activities listed previously. |

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